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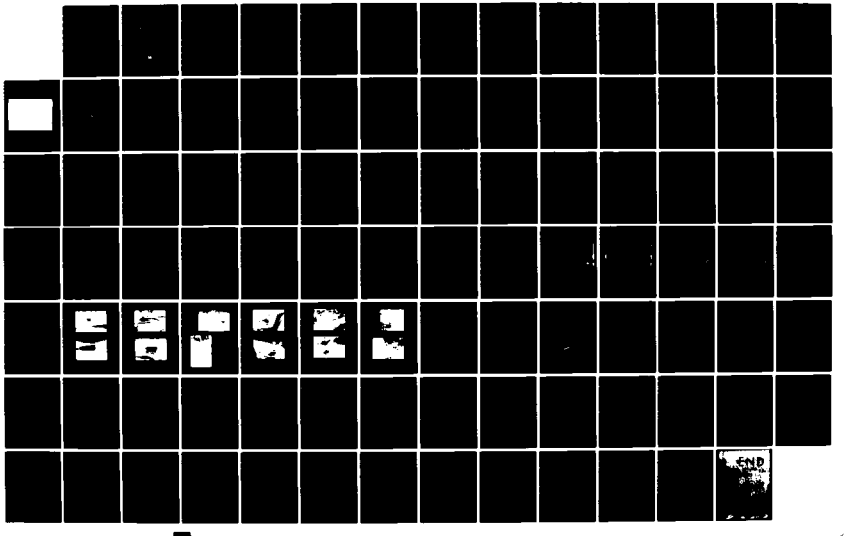

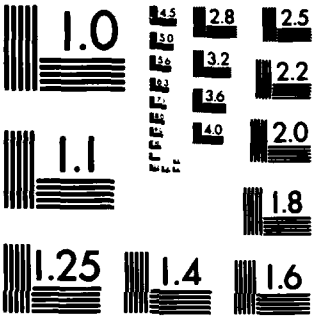

CONNECTICUT RIVER BASIN
WESTBROOK, CONNECTICUT

WRIGHTS POND DAM

CT 00393

PHASE 1 INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS

AUGUST, 1981

UNCLASSIFIED

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19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

DAMS, INSPECTION, DAM SAFETY,

Connecticut River Basin
Westbrook, Connecticut

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Wrights Pond Dam is an earth embankment with a masonry and concrete spillway. It is approximately 292 feet long and 12 feet high with a top width of 9 feet. Based on visual inspection and past operational performance, the dam is judged to be in FAIR condition. The dam is classified as SMALL in size and a HIGH hazard potential structure. The test flood for this dam is ½ the Probable Maximum Flood.

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DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254

REPLY TO
ATTENTION OF:

AUG 28 1971

NEDED

Honorable William A. O'Neill
Governor of the State of Connecticut
State Capitol
Hartford, Connecticut 06115

Dear Governor O'Neill:

Inclosed is a copy of the Wrights Pond Dam (CT-00393) Phase I Inspection Report, prepared under the National Program for Inspection of Non-Federal Dams. The report is based upon a visual inspection, a review of past performance, and a preliminary hydrological analysis.

The preliminary hydrologic analysis indicated that the spillway capacity for the Wrights Pond Dam would likely be exceeded by floods greater than 12 percent of the Probable Maximum Flood (PMF). Our screening criteria specifies that a dam classified as high hazard with a spillway capacity insufficient to discharge fifty percent of the PMF be judged as having a seriously inadequate spillway. As a result, this dam is assessed as unsafe, non-emergency, until more detailed studies prove otherwise or corrective measures are completed.

The term "unsafe" applied to a dam because of an inadequate spillway does not indicate the same degree of emergency as that term would if applied because of structural deficiency. It does indicate, however, that a severe storm may cause overtopping and possible failure of the dam, with significant damage and potential loss of life downstream.

We recommend that within twelve months from the date of this report the owner of the dam engage the services of a qualified registered engineer to determine further the potential of overtopping the dam and the need for and the means to increase project discharge capacity. Based on this determination, appropriate remedial mitigating measures should be designed and completed within 24 months of this date of notification. In the interim a detailed emergency operation plan and warning system should be promptly developed and round-the-clock surveillance should be provided during periods of heavy precipitation or high project discharge.

AUG 2 8 1

NEDED
Honorable William A. O'Neill

I approve the report and support the findings and recommendations described in Section 7, with qualifications as noted above. I request that you keep me informed of the actions taken to implement these recommendations since this follow-up is an important part of the program.

Copies of this report have been forwarded to the Department of Environmental Protection and to the owner, Pine Lake Club, Inc., Ansonia, CT. Copies will be available to the public in thirty days.

I wish to thank you and the Department of Environmental Protection for your cooperation in this program.

Sincerely,

C. E. EDGAR, III
Colonel, Corps of Engineers
Commander and Division Engineer

CONNECTICUT RIVER BASIN

WESTBROOK, CONNECTICUT

WRIGHTS POND DAM

CT 00393

PHASE 1 INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

NATIONAL DAM INSPECTION PROGRAM

PHASE I - INSPECTION REPORT

Identification No.:	CT 00393
Name of Dam:	Wrights Pond Dam
Town:	Westbrook
County and State:	Middlesex, Connecticut
Stream:	Falls River
Date of Inspection:	June 5, 1981

BRIEF ASSESSMENT

Wrights Pond Dam (also known as Pine Lake Dam) is an earth embankment with a masonry and concrete spillway. A vertical stone masonry wall forms the downstream face of the entire dam. It is approximately 292 feet long and 12 feet high with a top width of 9 feet. The dam was probably built around 1890 with improvements made in 1972. It is presently owned by the Pine Lake Club, Inc. and its purpose is and has always been recreational and aesthetics.

Based on the visual inspection and past operational performance, the dam is judged to be in **FAIR** condition. Seepage, brush, loose and missing stones were noted on the spillway. Brush and trees are growing on the embankments. Seepage was noted along the downstream toe of the eastern embankment. Riprap along the upstream face of the embankments is in need of repair.

The dam is classified as **SMALL** in size and a **HIGH** hazard potential structure in accordance with the Recommended Guidelines for Safety Inspection of Dams, by the Corps of Engineers. The impoundment storage at the top of the dam is 200 ac.-ft. and the maximum height of the dam is 12 feet. Failure of the dam could result in the loss of more than a few lives and damage to eleven houses. The depth of inundation at these homes would be 0 to 1 feet before and 1 to 2 feet after dam failure.

The test flood for this dam is 1/2 the Probable Maximum Flood (PMF). The test flood has an inflow equal to 4220 cfs and an outflow discharge equal to 4160 cfs with a stillwater elevation of 131.4 which will overtop the dam by 2.1 feet.

The maximum outflow capacity of the spillway with the water surface at the top of dam is 1060 cfs which is 25 percent of the test flood outflow.

It is recommended that the following actions be carried out by a qualified registered engineer. Conduct a detailed hydrologic/-hydraulic investigation to further assess the potential for overtopping the dam and the need for increasing the height of the dam or increasing the discharge capacity or a combination of both. Design measures for the removal of the trees and their respective root systems on the embankments and within 30 feet of the toe and backfilling with suitable compacted material; for the removal of vegetation from and the repointing of the joints on the downstream face of the spillway and embankments; and for the replacement of missing stones on the spillway. Investigate and monitor the seepage along the downstream toe of the eastern embankment. Design repairs to the riprap along the upstream face of the embankments. Inspect the downstream face of the spillway when water is not flowing over the spillway and make any required recommendations.

The following remedial measures should be taken by the owner: The removal of brush from the embankments and within 30 feet of the embankments, the placing of a permanent walkway on the framework from the spillway to the valve stem, insure the operability of the outlet works on an annual basis and development of a downstream warning plan and an annual inspection program.

Recommendations and remedial measures that should be implemented within one year of receipt of this Phase I Inspection Report are further described in Section 7.

JAMES P. PURCELL ASSOCIATES, INC.

Sudhir A. Shah

Sudhir A. Shah, P.E.
Director of Engineering
Connecticut P.E. No. 8012

This Phase I Inspection Report on Wrights Pond Dam (CT-00393) has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgment and practice, and is hereby submitted for approval.

CARNEY M. TERZIAN, MEMBER
Design Branch
Engineering Division

JOSEPH W. FINEGAN, JR. MEMBER
Water Control Branch
Engineering Division

ARAMAST MAHTESIAN, CHAIRMAN
Geotechnical Engineering Branch
Engineering Division

APPROVAL RECOMMENDED:

JOE B. FRYAR
Chief, Engineering Division

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation. However, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there by any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the spillway test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and downstream damage potential.

The Phase I Investigation does not include an assessment of the need for fences, gates, no-trespassing signs, repairs to existing fences and railings and other items which may be needed to minimize trespass and provide greater security for the facility and safety to the public. An evaluation of the project for compliance with OSHA rules and regulations is also excluded.

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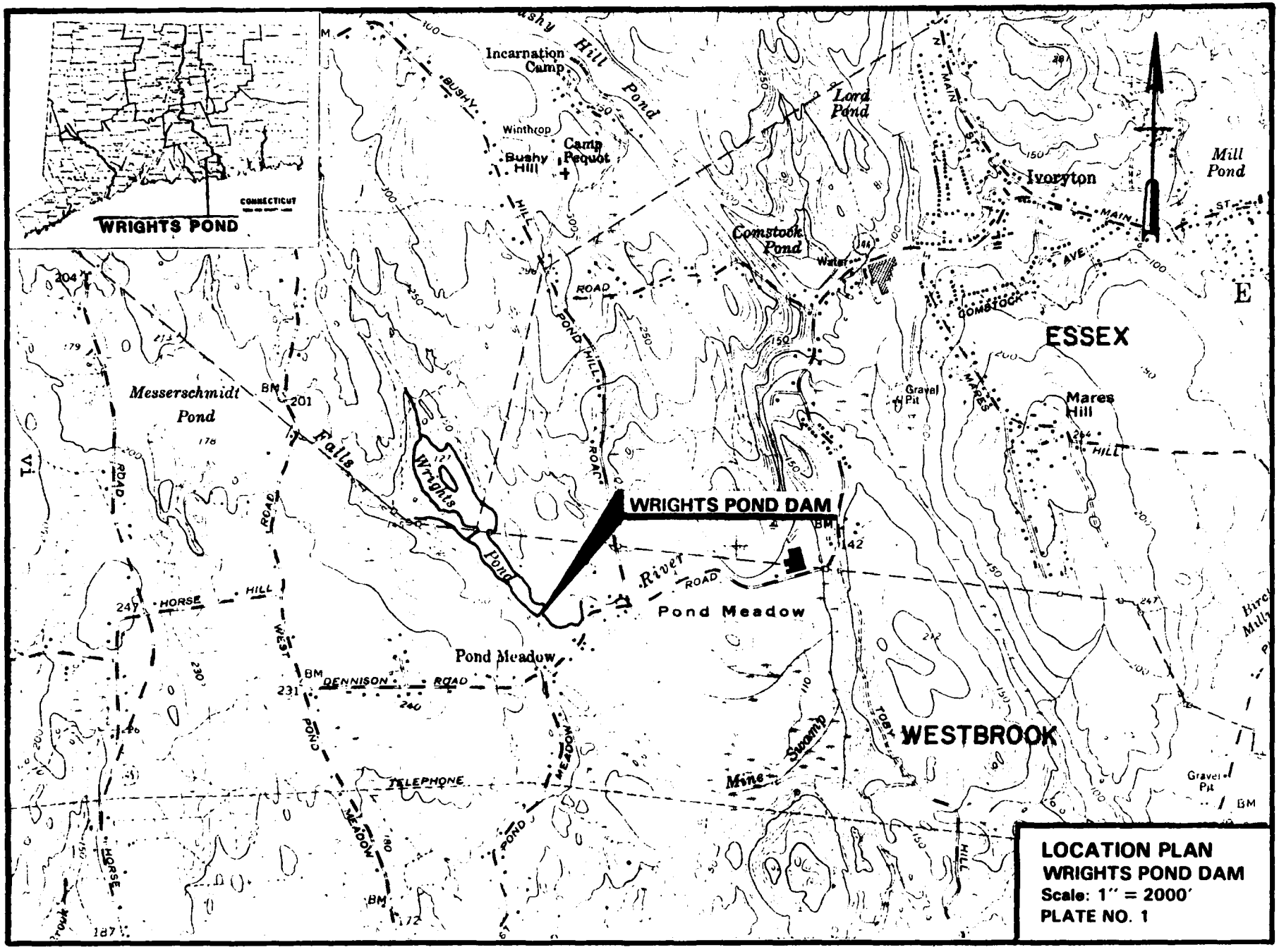
OVERVIEW PHOTO - WRIGHTS POND DAM


WRIGHTS POND
CONNECTICUT
WRIGHTS POND DAM
Incarnation Camp
Winthrop
Camp Pequot
Bushy Hill
Bushy Hill Pond
Lord Pond
Comstock Pond
Ivoryton
Mill Pond
ESSEX
Messerschmidt Pond
Falls
Wrights Pond
Gravel Pit
Mares Hill
Pond Meadow
Pond Meadow River
Dennison Road
Horse Hill Road
Telephone
Swamp
Mine
WESTBROOK
LOCATION PLAN
WRIGHTS POND DAM
Scale: 1" = 2000'
PLATE NO. 1

NATIONAL DAM INSPECTION PROGRAM

PHASE I - INSPECTION REPORT

NAME OF DAM: WRIGHTS POND DAM

SECTION 1

PROJECT INFORMATION

1.1 General

a. Authority:

Public Law 92-367, August 8, 1972, authorized the Secretary of the Army through the Corps of Engineers to initiate a national program of dam inspections throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. James P. Purcell Associates, Inc. has been retained by the New England Division to inspect and report on selected dams in the State of Connecticut. Authorization and notice to proceed was issued to James P. Purcell Associates, Inc., under a letter from William H. Hodgson, Jr., Colonel, Corps of Engineers. Contract No. DACW33-81-C-0009 has been assigned by the Corps of Engineers for this work.

b. Purpose:

1. Perform technical inspection and evaluation of non-federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-federal interests.

2. Encourage and prepare the States to initiate quickly, effective dam safety programs for non-federal dams.

3. To update, verify and complete the National Inventory of Dams.

1.2 Description of Project

a. Location:

The Wrights Pond Dam (also known as the Pine Lake Dam) is located in the Town of Westbrook approximately 2 miles southwest of the village of Ivorytown, Connecticut (See

Plate No. 1). This dam impounds water from Falls River and is located approximately six miles upstream of the confluence with the Connecticut River.

Wrights Pond is situated in a northwest/southeast direction with the dam at the southeast end. The dam is located at latitude 41°-19'-49.6" and longitude 72°-28'-09.5".

All elevations used in this report are based on the National Geodetic Vertical Datum (NGVD).

b. Description of Dam and Appurtenances:

The dam consists of a 192 foot long earth embankment with a masonry wall along the downstream face. This embankment is 12 feet high at the spillway end and tapers uniformally to zero at the abutment end. It is nine feet wide at the top with a vertical downstream face and a slope of approximately 1 1/2 horizontal to 1 vertical along the upstream face.

The upstream face of the west embankment is riprapped with 1-2 inch stone at the normal pool elevation. The upstream face of the east embankment is protected with large (3-5 foot) stones. This protection extends for approximately 55 feet east of the spillway.

The 100 foot long masonry and concrete spillway is located near the western end of the dam. It is 10 feet high and 11 feet wide with concrete wingwalls at each end.

The outlet works consist of a single 18 inch pipe through the center of the spillway section. The invert of the inlet of the 18 inch pipe is 8.5 feet below the spillway crest. The outlet opening is at the base of the spillway. Flow into the outlet is regulated by a valve which is operated from a valve stem located in the pond 10 feet upstream of the spillway.

c. Size Classification:

The size classification of this dam is **SMALL** as per the criteria set forth in the Recommended Guidelines for Safety Inspection of Dams, by the Corps of Engineers. The impoundment storage at the top of the dam is 200 ac.-ft. (within the range of 50 to 1000 ac.-ft.) and the maximum height of the dam is 12 feet (range of 25 to 40 feet). This size classification is based on the storage criteria.

d. Hazard Classification:

The hazard classification of this dam is **HIGH** as per the criteria set forth in the Recommended Guidelines for Safety Inspections of Dams, by the Corps of Engineers. The dam is located upstream of eleven houses where failure discharge could cause the loss of more than a few lives. The estimated water depth due to the assumed dam failure may range from 8 feet at the dam to 1 foot, 1500 feet downstream at Pond Hill Road. The depth of inundation at the homes would range from 0 to 1 foot before and range from 1 to 2 feet after dam failure. The homes are estimated to range from approximately 0 to 2 feet above the normal brook level.

e. Ownership:

Wrights Pond Dam is presently owned by the Pine Lake Club, Inc., c/o Mr. David A. Einbinder, Trustee, 497 Main Street, Ansonia, CT 06401. Telephone (203) 734-9246.

f. Operator:

The Town of Westbrook has been given authority by the owners to operate the outlet works of the dam as it deems necessary.

Mr. John Riggio, Foreman
Highway Department
Town of Westbrook
Hall of Records
Boston Post Road
Westbrook, CT 06498
Telephone: (203) 399-9723

g. Purpose:

The former and present purpose of the dam is recreation, fishing and aesthetics.

h. Design and Construction History:

Wrights Pond Dam was probably built around 1890. In 1972, the spillway was enlarged to twice its original size and the spillway wingwalls were added.

i. Normal Operating Procedure:

The outlet valve is normally closed and all flow is discharged over the spillway.

1.3 Pertinent Data

a. Drainage Area:

The Wrights Pond drainage basin is roughly rectangular in shape with a length of 3.8 miles and an average width of 1.3 miles resulting in a total drainage area of 5.0 square miles (see drainage basin map in Appendix D). The topography is generally rolling terrain with elevations ranging from a high of 430 feet to a low of 127.0 at the spillway crest. Stream and basin slopes are moderate, 1.5 percent to 10 percent, respectively. This reservoir has a normal surface of 30 acres which is 0.9 percent of the watershed. The upstream Messerschmidt Pond has a normal surface area of 80 acres which is approximately 2.5 percent of the watershed. Eighty percent of the watershed drains into the Messerschmidt Pond.

b. Discharge at Dam Site:

Listed below are calculated discharge values for the spillway and outlet works (18 inch outlet):

1. Outlet Works: An 18 inch pipe with an intake at elevation 118.5 and a discharge capacity of 27 cfs at elevation 129.3.

2. Maximum known discharge at dam site: Unknown. There are no specific discharge records available for this dam.

3. Ungated spillway capacity at top of dam: 1060 cfs at elevation 129.3.

4. Ungated spillway capacity at test flood elevation: 2850 cfs at elevation 131.4.

5. Gated spillway capacity at normal pool elevation: N/A

6. Gated spillway capacity at test flood elevation: N/A

7. Total spillway capacity at test flood elevation: 2850 cfs at elevation 131.4.

8. Total project discharge at top of dam: 1090 cfs at elevation 129.3.

9. Total project discharge at test flood elevation: 4160 cfs at elevation 131.4.

c. Elevation (Feet Above NGVD)

1.	Stream bed at toe of dam	117.3
2.	Bottom of cutoff	Unknown
3.	Maximum tailwater	Unknown
4.	Normal pool	127.0
5.	Full flood control pool	N/A
6.	Spillway crest	127.0
7.	Design surcharge (Original Design)	Unknown
8.	Top of dam	129.3 (Existing Embankment) 130.5 (1972 Design)
9.	Test flood level	131.4

d. Reservoir (Length in Feet):

1.	Normal pool	3400
2.	Flood control pool	N/A
3.	Spillway crest pool	3400
4.	Top of dam	3500
5.	Test flood pool	3600

e. Storage (acre-feet):

1.	Normal pool	131
2.	Flood control pool	N/A
3.	Spillway crest pool	131
4.	Top of dam	200
5.	Test flood pool	264

f. Reservoir Surface (acres):

1.	Normal pool	30
2.	Flood control pool	N/A

3.	Spillway crest	30
4.	Test flood pool	30
5.	Top of dam	30
g. Dam:		
1.	Type	Earth embankment with vertical stone masonry wall along downstream face.
2.	Length	292 feet
3.	Height	12.0 feet
4.	Top width	9.0 feet
5.	Side slopes	Upstream - 1.5H:1V Downstream - Vertical Stone Wall
6.	Zoning	Unknown
7.	Impervious core	Unknown
8.	Cutoff	Unknown
9.	Grout curtain	Unknown
10.	Other	- -
h. Diversion and Regulating Tunnel:		N/A
i. Spillway		
1.	Type	Broad crested overflow. Concrete and stone masonry.
2.	Length of weir	100.0 feet
3.	Crest elevation	127.0
4.	Gates	None
5.	U/S Channel	Natural bed
6.	D/S Channel	Overgrown gravel and stone channel

7.	General	---

j. Regulating Outlets:

Refer to Paragraph 1.2b - "Description of Dam and Appurtenances" for description of Outlet Works.

1.	Invert and size	18 inch pipe - 118.5 feet
2.	Description	Unknown
3.	Control Mechanism	Valve with a hand operated valve stem in center of spillway section
4.	Other	---

SECTION 2

ENGINEERING DATA

2.1 Design

There are limited available records presenting design information for the construction of Wrights Pond Dam. A plan sheet showing the 1972 modifications to the dam has been included in Appendix B of this report.

2.2 Construction

There are no available records of the original construction of this dam.

2.3 Operation

No formal records of operation are kept for this dam.

2.4 Evaluation

a. Availability:

The information noted above for this facility is available in the files of the Department of Environmental Protection, Water Resources Unit, Dam Safety Engineers, State Office Building, Hartford, Connecticut, and the Pine Lake Club, Inc., Ansonia, Connecticut.

b. Adequacy:

The lack of indepth engineering data did not allow a definitive review. Therefore, the adequacy of this dam could not be assessed from the standpoint of reviewing design and construction data alone, but is based primarily on the visual inspection, the dam's past performance, and sound engineering judgment.

c. Validity:

The validity of the limited information available could not be verified.

SECTION 3

VISUAL INSPECTION

3.1 Findings

a. General:

The visual inspection of the Wrights Pond Dam was conducted on June 5, 1981 and a copy of the visual inspection check list is contained in Appendix A of this report.

The following procedure was used:

1. Inspection of the upstream area of the pond which is impounded by the dam.

2. Visual inspection of the face and top of the dam and spillways for cracks, loose stones, seepage, etc.

3. Inspection of the outlet works and other appurtenances as to their existence, location, and operability.

4. Review of procedures that could be utilized in the event of an emergency situation.

5. A check of the downstream area for seepage, piping, boils or other indications of abnormal conditions. The downstream hazard potential in the event of dam failure was investigated.

6. Photographs of the general area of the dam and specific items of note were taken and are included in Appendix C of this report.

Before the inspection, the available existing data was studied and reviewed.

b. Dam:

1. Crest: The top of the dam to the east of the spillway is approximately 9 feet wide and extends approximately 160 feet to natural ground. This crest elevation is non-uniform and is approximately one foot lower than the 1972 design elevation (top of spillway wingwall). It is vegetated with brush and small trees and contains a footpath (Photo C-1). There is

erosion of the top of the embankment immediately behind the spillway wingwalls. These eroded areas vary in depth up to approximately one half foot. To the west of the spillway, the top of the dam extends approximately 32 feet and is grassed (Photo C-3). It is also approximately one foot lower than top of the adjacent spillway wingwall (Photo C-1).

2. Upstream Face: The eastern upstream face is an earth slope at 1.5H:1V and is heavily vegetated with brush and small trees (Photo C-5). Boulder riprap extends along the waterline 55 feet east from the spillway. There is some minor erosion near the spillway wingwall. A good grass cover extends to the waterline at the western end of the dam (Photo C-3). The riprap at the waterline is showing signs of minor erosion (right side of Photo C-3).

3. Downstream Face: The downstream face of the entire dam is a vertical stone masonry wall (Photo C-6). This wall varies in height from 12 feet at the spillway to zero at the abutments. No seepage was observed on the wall, however, a seepage stream (approximately 5 GPM-clear) was observed flowing four feet downstream of the stone wall beginning approximately 90 feet east of the spillway (See Plan Page B-13). There are rust colored deposits where this stream joins the downstream channel. This seepage has existed at least since 1970 as indicated by a state order to repair dams of March, 1970.

c. Appurtenant Structures:

1. Spillway: The spillway is a 100 foot long by 11 foot wide stone masonry and concrete structure near the western end of the dam. (Photos C-1, C-2). The eastern half of the spillway is the original spillway for the dam. It is constructed of stone masonry with a concrete covering (Photos C-4, C-8). This covering is spalled but still adequate and there are many missing and loose stones, seepage and brush along the downstream face (Photos C-8, C-9). Because of flow over the spillway, the rate of seepage between the stones in the downstream face could not be determined. No evidence of fines was noted in the seepage. The outlet of the 18 inch pipe is at the base of this spillway section (Photo C-11). A concrete wingwall was added in 1972 and is in good condition (Photo C-4). There is a void under the

downstream end of the spillway wingwall apparently due to an incomplete concrete pour during construction.

The western half of the spillway was built in 1972 and consists of reinforced concrete over earth fill with the original stone masonry downstream face (Photo C-3). Brush is growing from some of the joints (Photo C-7) and some large voids were observed between the stones (Photo C-11). Water was flowing over this half of the spillway during the inspection and the existence of seepage could not be determined. The concrete portion of the spillway and wingwall is in good condition (Photo C-3).

2. Outlet Works: An 18 inch pipe extends from a valve approximately 10 feet upstream of the spillway, through the original spillway section to a square masonry opening on the downstream face (Photo C-11). An angle iron framework, in good condition, extends from the spillway to the valve stem (Photo C-10). This valve is usually closed and was last opened in 1972 to drain the pond prior to modifying the dam. It is not known if the valve is presently operable. The wrench for opening the valve is kept at the Town of Westbrook's Highway Department.

d. Reservoir Area:

The pond is formed by the flooding of a portion of the Falls River Valley. The sides of the forested valley have gentle slopes bordering the pond. No unusual geologic features were noted that could be expected to adversely affect the dam or appurtenant structures.

Trespassing on the dam is not permitted.

e. Downstream Channel:

The downstream channel is an overgrown gravel and stone streambed (Photo C-12). A house is located approximately 300 feet downstream along the west bank of the stream. The basement floor of this house is approximately one foot below the spillway crest elevation.

3.2 Evaluation

Based on visual inspection, the Wrights Pond Dam appears to be in fair condition overall and there were no major areas of distress noted. Specific areas of concern that were noted are as follows:

a. The presence of seepage and brush on the downstream face of the spillway.

b. Missing and loose stones on the downstream face of the spillway.

c. Brush and trees on the embankments.

d. The irregularity of the top of the embankments and their being one foot lower than their design elevation.

e. Seepage near the downstream face of the eastern embankment.

f. Erosion of the riprap along the upstream face of the embankment.

g. The outlet works should be tested for operability.

SECTION 4

OPERATIONAL AND MAINTENANCE PROCEDURES

4.1 Operational Procedures

a. General:

The pond is presently used solely for recreation and all flow is discharged over the spillways.

b. Description of Any Warning System in Effect:

No formal emergency or contingency plan is in effect to reduce or minimize downstream damage in emergency situations.

4.2 Maintenance Procedures

a. General:

There is no regular maintenance schedule for this dam.

b. Operating Facilities:

No regular maintenance of the outlet works was reported.

4.3 Evaluation

To insure the safety of the residents downstream, a regular inspection and maintenance program and a formal downstream warning plan should be developed and implemented.

SECTION 5

EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

5.1 General

The Wrights Pond Dam creates an impoundment with a total storage capacity of 131 ac.-ft. at elevation 127.0, the spillway crest elevation. Each foot of depth in the reservoir above the spillway crest can accommodate approximately 30 ac.-ft. The spillway is a 100 foot long by 11 foot wide broad crested uncontrolled weir. Eighty percent of the drainage area drains to the upstream Messerschmidt Pond. Messerschmidt Pond may have an effect on the flows into Wrights Pond depending on conditions in Messerschmidt Pond and of its outlet works. Stream and basin slopes are moderate, 1.5 percent and 10 percent, respectively.

5.2 Design Data

a. No specific design data is available for this watershed or the structures of the Wrights Pond Dam. In lieu of existing design information, USGS topographic maps (scale 1"-2000') were utilized to develop hydrologic parameters such as drainage area, basin length, time of concentration, and other runoff characteristics. Elevation-storage relations for the reservoir were approximated. Reservoir surface area and surcharge storage were computed using the USGS maps. Some of the pertinent hydraulic design data was obtained and/or confirmed by actual field measurements at the time of visual inspection.

b. Outflow values (routing procedures) amd dam overtopping analysis were computed in accordance with the guidelines developed by the Corps of Engineers. Judgment was used in calculating final values outlined in this report, which are quite approximate and should not be considered a substitute for actual detailed analysis.

5.3 Experience Data

Historical data for recorded discharges is not available for this dam.

5.4 Test Flood Analysis

Recommended Guidelines for the Safety Inspection of Dams by the Corps of Engineers were used for the selection of the

"Test Flood". This facility is classified as a HIGH hazard and SMALL size structure. Guidelines indicate that the range of 1/2 the Probable Maximum Flood (PMF) to the PMF be used as the "Test Flood" for these classifications. A test flood of 1/2 PMF was chosen due to the small size of the dam. The watershed has a total area of 5.0 square miles. Snyder's lag was calculated to be 3.7 hours and a Snyder peaking coefficient of 0.625 was used. The 200 square mile - 24 hour Probable Maximum Precipitation (PMP) is 22.0 inches. The flood hydrograph package, HEC-1 computer program, developed by the Corps of Engineers was utilized to develop the inflow hydrograph, route the flood through the reservoir, and for the dam overtopping analysis. A test flood inflow equal to the 1/2 PMF was calculated to be 4220 cfs (845 CSM).

This test flood analysis assumes that the outlet works are closed. This analysis was conducted with the embankment at its present elevation, which is approximately one foot lower than the 1972 design elevation. It was also assumed that there is no retention in the upstream Messerschmidt Pond.

The spillway capacity is hydraulically inadequate to pass the test flood (1/2 PMF) and overtopping of the dam will occur. The maximum outflow capacity of the spillway without overtopping the dam is 1060 cfs. This corresponds to approximately 25 percent of the test flood outflow. The maximum outflow discharge value for the test flood is 4160 cfs corresponding to a depth of flow over the top of the dam of 2.1 feet. A spillway rating curve, an outlet rating curve, and a reservoir stage-capacity curve, are included in Appendix D of this report.

At the spillway elevation of 127.0, the capacity of the 18 inch outlet structure is 24 cfs. It will require approximately 24 hours to lower the water level the first foot assuming a water surface area of 30 acres, normal inflow conditions, and use of the outlet works to regulate the water level for expected inflows.

5.5 Dam Failure Analysis

This dam is classified as a HIGH hazard structure. Failure discharge could cause the loss of more than a few lives and damage due to high velocities, impact from debris, and flooding to eleven homes along the downstream channel.

The calculated dam failure discharge is 3300 cfs due to an assumed breach width of 32 feet and a pre-failure pool level equal to the top of the dam. At this level the prefailure flow in the downstream channel will be equal to the full

spillway's capacity of 1060 cfs corresponding to a depth flow of approximately 1 foot throughout the impact area. Failure will produce a water surface level of approximately 8 feet immediately downstream from the dam. Eleven homes within the impact area may be inundated by 0 to 1 foot before and 1 to 2 feet after dam failure. These homes are estimated to range from 0 to 2 feet above the normal brook level. The failure discharge can affect downstream areas for a distance of 1500 feet from the dam. At this distance, the water surface level will be approximately at prefailure conditions as Falls River crosses Pond Hill Road. Water surface elevations due to the failure of the dam are listed on Page D-21. Probable consequences including the prime impact areas are listed on Page D-25.

The Messerschmidt Pond Dam is located approximately 5000 feet upstream of the dam and failure of this upstream dam would create a potential hazard at the Wrights Pond Dam.

SECTION 6

EVALUATION OF STRUCTURAL STABILITY

6.1 Visual Observation

The visual inspection revealed no signs of major physical distress in the structure. The most significant items noted relative to the stability of the dam are: the seepage along the toe of the east embankment and through the downstream spillway face; the low areas in the embankments behind the spillway wingwalls; the elevation of the east embankment being one foot below top of dam which could result in this area being overtopped in high flows; and the loose and falling stones in the downstream face of the spillway which could lead to the structural instability of the spillway.

The seepage conditions have reportedly existed for at least 10 years (refer to past inspection reports, Appendix B-2), however, no estimates of seepage flows are available and it is not known if this condition has been changing. Although the seepage condition does not appear to immediately affect the stability of the dam, it should be monitored and investigated further with repairs being made as necessary.

Other minor deficiencies such as brush growth on the embankments and minor erosion are noted in Section 3.

6.2 Design and Construction

There is insufficient design and construction data to permit a formal evaluation of stability.

6.3 Post-Construction Changes

In 1972, the spillway was enlarged and the spillway wingwalls were added.

6.4 Seismic Stability

The dam is in Seismic Zone 1 and hence does not require evaluation for seismic stability according to the Corps of Engineers Recommended Guidelines.

SECTION 7

ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition:

Based on the visual inspection, past performance and hydraulic/hydrologic evaluation, the Wrights Pond Dam and appurtenances are judged to be generally in FAIR condition. Items of concern that should be addressed as a result of this inspection are listed in Sections 7.2 and 7.3.

b. Adequacy of Information:

The limited engineering data did not allow for a definitive review. Therefore, the adequacy of the dam is based on visual inspection, past performance history, and engineering judgment.

c. Urgency:

The recommendations and remedial measures described below should be implemented by the owner within one year after receipt of this Phase I Inspection Report.

7.2 Recommendations

It is recommended that the owner engage a qualified registered engineer to carry out the following actions and that his recommendations be implemented.

a. A detailed hydrologic/hydraulic investigation be performed to further assess the potential for overtopping the dam and the need for increasing the height of the dam or increasing the project discharge capacity or a combination of both.

b. Design measures for the removal of the trees and their respective root systems on the embankments and within 30 feet of the downstream toe and the backfilling with suitable compact material.

c. The vegetation should be removed from the joints and the joints repointed on the downstream face of the spillway and embankments.

d. The missing stones should be replaced on the spillway.

e. Inspect the downstream face of the spillway when no water is flowing over the spillway and make any required recommendations.

f. Investigate and monitor the seepage through the spillway and along the downstream toe of the eastern embankment.

g. Design repairs to the riprap along the upstream face of the embankments.

7.3 Remedial Measures

a. Operation and Maintenance Procedures:

1. Clear the brush from the embankments and within 30 feet of the downstream toe of the embankments.

2. Place a permanent walkway on the existing angle iron framework from the spillway to the valve stem.

3. Develop a surveillance and downstream warning plan, including round-the-clock monitoring during heavy precipitation.

4. Institute a program of annual and periodic technical inspection.

5. Insure the operability of the outlet works on an annual basis.

7.4 Alternatives

There are no practical alternatives to the above stated recommendations.

APPENDIX A

INSPECTION CHECK LIST

INSPECTION CHECK LIST

PARTY ORGANIZATION

PROJECT Wrights Pond Dam

DATE June 5, 1981

TIME 1:00 - 4:00PM

WEATHER Sunny

W.S. ELEV. _____ U.S. _____ DN.S.

PARTY:

1. R. Johnston, JPPA
2. J. Hewes, JPPA
3. J. Walsh, Baystate Environmental Consultants
4. _____
5. _____
6. D. Kreiger, Pine Lake Club Inc.
7. _____
8. _____
9. _____
10. _____

	PROJECT FEATURE	INSPECTED BY	REMARKS
1.	Hydraulics	R. Johnston	
2.	Structural	J. Hewes	
3.	Geotechnical	J. Walsh	
4.			
5.			
6.			
7.			
8.			
9.			
10.			

INSPECTION CHECK LIST

PROJECT Wrights Pond Dam DATE June 5, 1981

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
DAM EMBANKMENT	
Crest Elevation 129.3	Grass and brush
Current Pool Elevation 127.0	Spillway crest
Maximum Impoundment to Date	Unknown
Surface Cracks	N/A
Pavement Condition	N/A
Movement or Settlement of Crest	Crest is non-uniform
Lateral Movement	None observed
Vertical Alignment	Irregular crest surface
Horizontal Alignment	Good
Condition at Abutment and at Concrete Structures	Erosion behind spillway training walls
Indications of Movement of Structural Items on Slopes	N/A
Trespassing on Slopes	Footpath along crest.
Vegetation on Slopes	Grass-west, brush & trees - east
Sloughing or Erosion of Slopes or Abutments	Minor erosion along upstream face. Erosion behind training walls.
Rock Slope Protection - Riprap Failures	Thin riprap along west upstream face. Boulders along east upstream face.
Unusual Movement or Cracking at or near Toes	None observed
Unusual Embankment or Downstream Seepage	Seepage along toe of east embankment 4 feet below toe. Seepage thru masonry spillway.
Piping or Boils	None Observed
Foundation Drainage Features	None Observed
Toe Drains	None Observed
Instrumentation System	None Observed

INSPECTION CHECK LIST

PROJECT Wrights Pond Dam DATE June 5, 1981

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
Outlet works	18" pipe outlet through spillway section
a. Approach channel	Entire pond bed - underwater
b. Intake Structure	Assumed free intake
c. Transition and conduit	Valve stem is located in pond upstream of spillway. Last opened in 1972 during dam repairs. A 18 inch pipe extends through the base of the older spillway section.
d. Outlet Structure	A 3 foot wide by 1.5 foot high opening at the base of the downstream face of the spillway section
e. Outlet Channel	Spillway discharge channel
f. Service Bridge	An angle iron framework extends from the spillway to the valve stem. Surface rust visible.

INSPECTION CHECK LIST

PROJECT Wrights Pond Dam DATE June 5, 1981

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	
a. Approach Channel	Pond Bed - underwater Western half of spillway section contains a 4H:1V slope into the pond. Eastern half of spillway section contains a nearly verticle upstream face.
b. Weir and Training Walls	
General Condition of Concrete	Training walls - good Weir - fair
Rust or Staining	N/A
Spalling	Concrete spalling. Some loose masonry
Any Visible Reinforcing	One re-bar exposed on east training wall
Any Seepage or Efflorescence	Seepage through masonry along downstream face of spillway.
Drain Holes	None Observed
c. Discharge Channel	
General Condition	Overgrown
Loose Rock Overhanging Channel	None Observed
Trees Overhanging Channel	Yes
Floor of Channel	Sand, gravel and stone
Other Obstructions	Woods

APPENDIX B

ENGINEERING DATA

APPENDIX B-1

DESIGN, CONSTRUCTION AND MAINTENANCE RECORDS

Location	Items
Mr. Victor J. Galgowski Dam Safety Engineer Water Resources Unit Department of Environmental Protection State of Connecticut State Office Building Hartford, Connecticut 06115	*1. Plan of 1972 Repairs 2. Certificate of Approval for 1972 Repairs *3. Past Inspection Reports *4. State Order to Repair Dam (1970) 5. Miscellaneous Correspondence
Pine Lake Club, Inc. c/o Mr. David Einbinder, Trustee 497 Main Street Ansonia, CT 06401	*1. Plan of 1972 Repairs 2. Miscellaneous Correspondence

* Indicates material contained in this Phase I Inspection Report.

APPENDIX B-2

COPIES OF PAST INSPECTION REPORTS

MACCHI & HOFFMAN • ENGINEERS

EXECUTIVE OFFICES • 44 GILLETT STREET • HARTFORD, CONN., 06105 • PHONE (203) 549-6190

A. J. MACCHI, P.E.
JOSE H. COSIO, P.E.
MICHAEL GIRARD, P.E.

ASSOCIATE CONSULTANT
PROF. C. W. DUNHAM

November 10, 1972

Dept. of Environmental Protection
Water & Related Resources
165 Capitol Avenue
Hartford, Connecticut

Attention Mr. William H. O'Brien III

Re: Wright's Pond Dam
Westbrook, Connecticut

Gentlemen:

On Friday, November 10, 1972 Mr. William H. O'Brien of the Departmentof Environmental Protection and myself inspected the above-reverenced dam.

The owner of the dam is Pine Lake Club Inc., c/o David Einburder, 497 Main St., Ansonia, Connecticut.

Attorney for the owner is Arthur Abeshouse, 35 Elm St., New Haven, 06510.

Professional Engineer representing the owner is Anthony Giordano, 541 Washington Avenue, West Haven, Connecticut.

Contractor for the owner is Ivan Sachs, 102 Cherry Hill Road, Branford, Connecticut.

The dam is constructed of a large masonry wall topped with concrete in the spillway and gravel sand over the main portion remaining. The dam is in a generally good state of repair, however, some leaks and seepage were noted which are of no consequence. The following is to be corrected:

1. At the North end of the dam - trees are to be removed and upstream faced with placed field stone to avoid erosion.

2. At the North end of the dam - new spillway endwall presently backfilled with sand and gravel is to be removed and back-filled with large masonry and grout joints upstream to avoid "piping".

Dept. of Environmental Protection
Water & Related Resources
Hartford, Connecticut

November 10, 1972

3. Surface to be topped with loam and seeded.

4. At the South wing wall of the spillway, remove end of projecting stone.

5. Plank walkway presently in spillway to be removed including support pins.

Very truly yours,

MACCHI & HOFFMAN, ENGINEERS

A. J. MACCHI

November 2, 1972

Mr. Arthur A. Abeshouse
Attorney at Law
35 Elm Street
New Haven, Connecticut 06510

Re: Pine Lake Club, Inc.
Wrights Pond Dam, Westbrook

Dear Attorney Abeshouse:

In reply to your letter of October 11, 1972 addressed to Mr. William H. O'Brien, I regret a Certificate of Approval from this department for the subject dam can not be issued at the present time.

An inspection of this site was conducted on October 27, 1972 by the undersigned which revealed the following areas of concern:

1. Considerable water flow through the stones on the face of the dam in an area approximately five feet west of the abutment of the added section of the spillway.

2. Seepage at the toe of the eastern end of the dam.

3. An improperly designed access to the gate control stem.

We will schedule a meeting at the site with your client's engineer and our consultant to resolve these deficiencies as soon as possible.

Very truly yours,

Victor F. Galgowski

Victor F. Galgowski
Supt. of Dam Maintenance
Water & Related Resources

VFG:ljg

cc: David A. Einbinder
Anthony V. Giordano

INTERDEPARTMENT MESSAGE

STO-201 12-69

SAVE TIME: *Handwritten messages are acceptable. Use carbon if you really need a copy. If typewritten, ignore faint lines.*

TO	AGENCY	DATE
File	Water Resources Commission	March 29, 1971
FROM	**AGENCY**	**TELEPHONE**
William H. O'Brien, III Civil Engineer	Water Resources Commission	

SUBJECT: Wrights Pond Dam, Westbrook

On March 9, 1971 the undersigned inspected the subject dam.

The following work had been done:

a) a large flat rock approximately 3'x2'x6" had been placed over the spot where water had been flowing thru the top of the dam. From the downstream side of the masonry it appeared that this had reduced the leaks thru the dam. But it could not be determined if water was flowing down thru the top of the dam beneath the rock.

b) trees had been removed on the earth embankment on the west side of the spillway.

c) soil had been placed on the downstream side of the masonry wall at the extreme west and (apparently a surplus from d)

d) soil had been placed on the top west of the spillway to dress it off.

W. H. O'Brien, III
Civil Engineer

WHO:ljg

Architect-Mr. Abelouze, Esq on 4/7/71. Requested letter by April 19, 1971 in answer to our letter of March 8, 1971 WHO

March 18, 1970

Pine Lake Club, Inc.
c/o David Winbinder, Trustee
497 Main Street
Ansonia, Connecticut

Re: Wright's Pond Dam
Westbrook

Gentlemen:

According to the records in this office, the dam on Falls River just north of the village of Pond Meadow, in the town of Westbrook, known as Wright's Pond Dam is under your ownership.

Section 25-110 of the 1958 Revision of the General Statutes places under the jurisdiction of this Commission, all dams, ... which by breaking away or otherwise, might endanger life or property ..." The Commission finds that the failure of this dam would endanger life or property.

In accordance with Section 25-111 of the 1963 Supplement to the General Statutes, this dam has been inspected and was found to be in an unsafe condition. The statute states in part: If after any inspection described herein, the Commission finds any such structure to be in an unsafe condition, it shall order the person, firm or corporation owning or having control thereof to place it in a safe condition or to remove it, and shall fix the time within which such order shall be carried out..

The Commission notes that our letters to you dated June 20, 1969, December 2, 1969, and February 11, 1970, have not been answered.

FINDING

Based on the engineer's report covering the inspection of this dam, the Water Resources Commission finds the structure to be in an unsafe condition. It also finds that certain repairs or alterations are necessary to place the structure in a safe condition.

The repairs or alterations to be made should include but are not necessarily limited to the following items:

Pine Lake Club, Inc. March 18, 1970

1. Repair the upstream masonry wall and top of dam west of the spillway which has eroded away.

2. Repair voids in the dam caused by water flowing through from the top.

3. Stop or reduce to an acceptable level, all leaks through the dam.

4. Determine source of ground seepage at the downstream toe of the dam at the east end and correct.

5. Check spillway adequacy.

6. Remove all trees on or within 20 feet of the dam.

7. Take immediate temporary measures to eliminate or greatly reduce the volume of flow through the top of the dam until permanent repairs can be made.

ORDER

In accordance with Section 25-111 of the 1963 Supplement to the General Statutes, you are hereby ordered to make the repairs and modifications necessary to place the structure in a safe category or to remove the structure.

Any repairs or modifications to the structure, or its removal shall be carried out in accordance with plans and specifications prepared by an engineer registered in the State of Connecticut and bearing his certification and seal. Such plans shall be submitted to this Commission for approval and for the issuance of a Permit prior to any construction or demolition work in accordance with Section 25-112 of the General Statutes.

The Commission shall be notified in writing before April 15, 1970 as to what steps you have taken or will take to comply with this ORDER. Plans for the permanent repair or removal of this dam shall be submitted prior to June 15, 1970. The permanent work indicated

shall be completed by September 15, 1970. The temporary work (item 7) shall be under the direction of an engineer registered in the State of Connecticut, and with the approval of the Water Resources Commission and shall be completed by April 30, 1970.

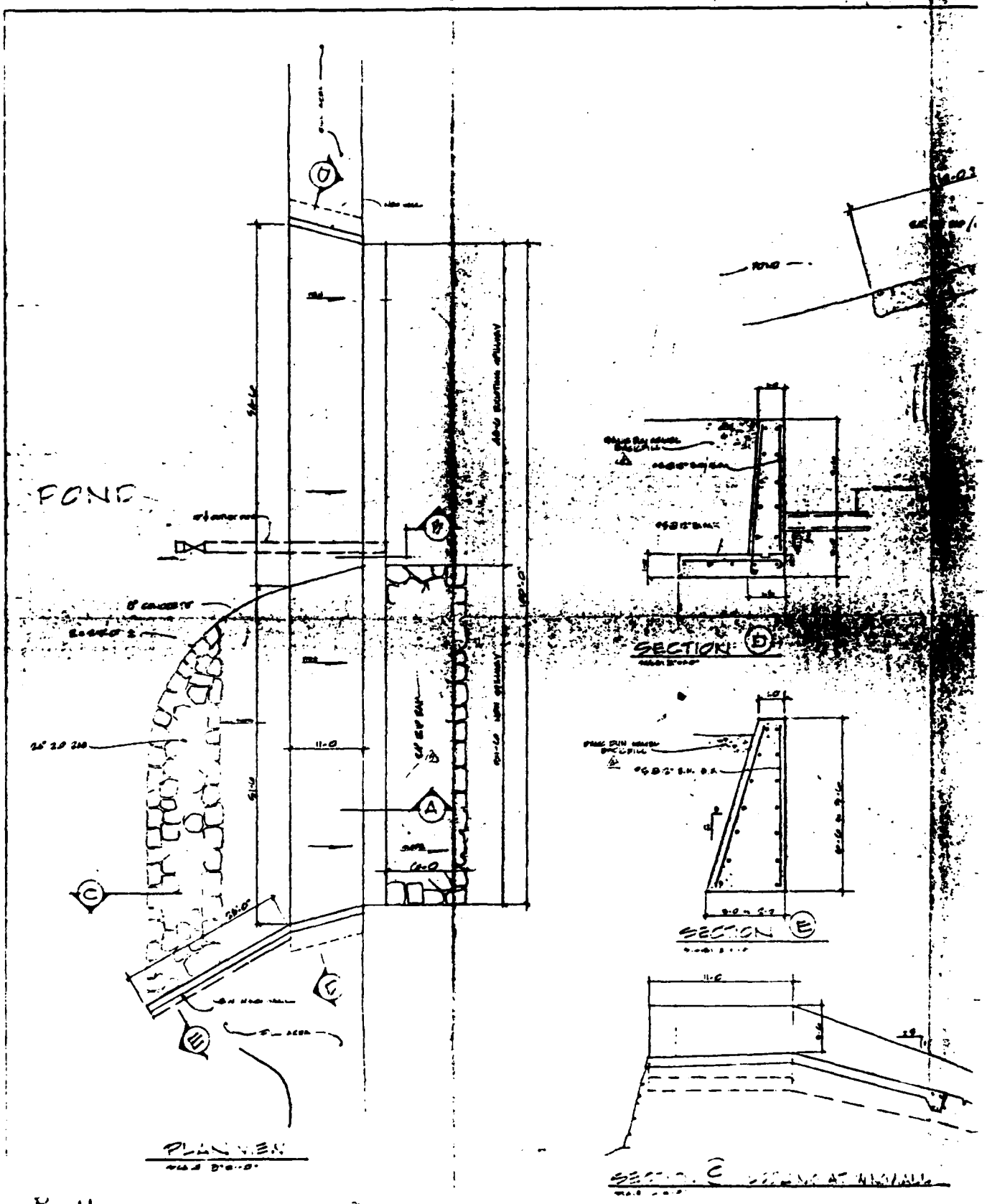
Very truly yours,

John J. Curry
Director

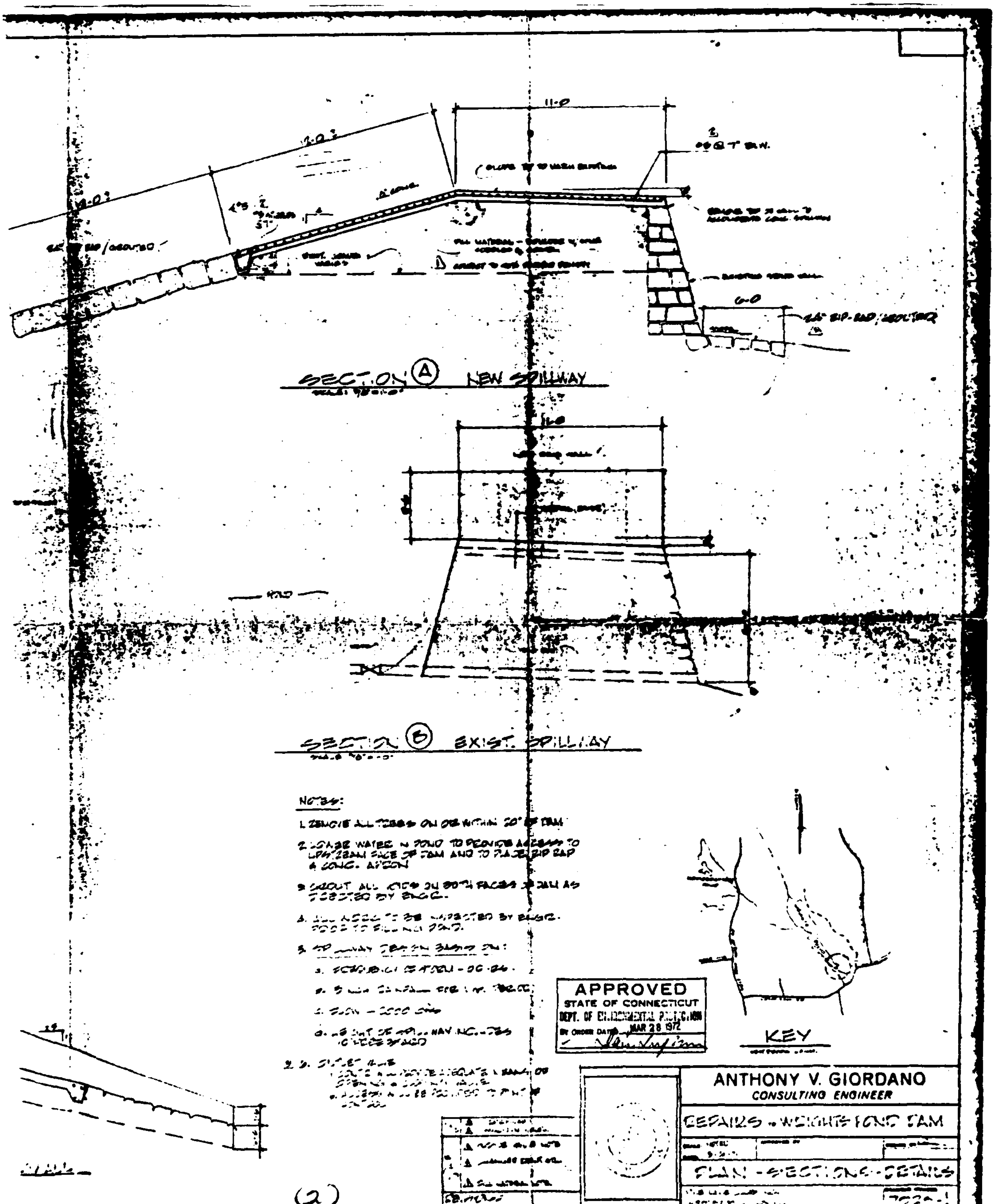
JJC/lch

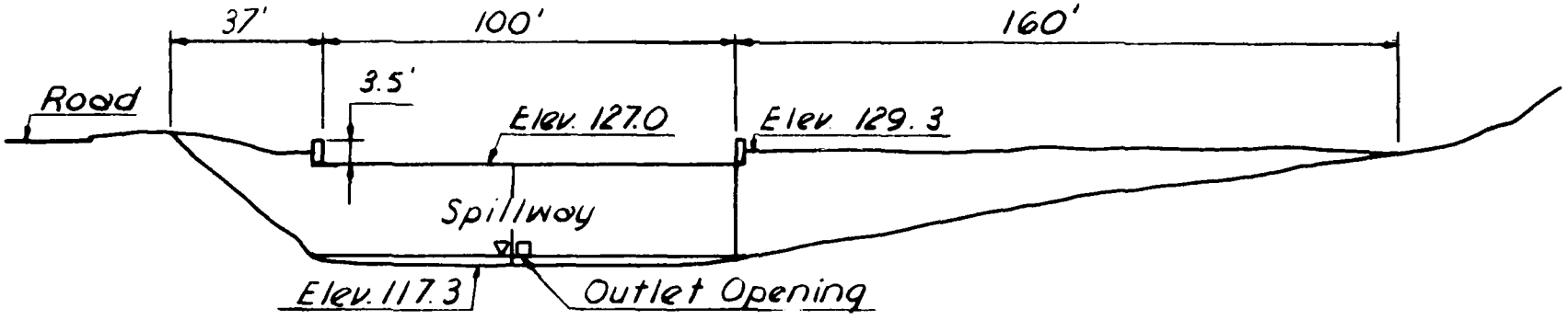
APPENDIX B-3

RECORD DRAWINGS AND SKETCHES



E-11


11-0
SECTION (A) NEW SPILLWAY
SECTION (B) EXIST. SPILLWAY
NOTES:
2. LOWER WATER IN POND TO PROVIDE ACCESS TO UPSTREAM FACE OF DAM AND TO PLACE RIP RAP & CONC. APRON
APPROVED
STATE OF CONNECTICUT
DEPT. OF ENVIRONMENTAL PROTECTION
MAR 28 1972
KEY
ANTHONY V. GIORDANO
CONSULTING ENGINEER
PLAN - SECTIONS - DETAILS
(2)



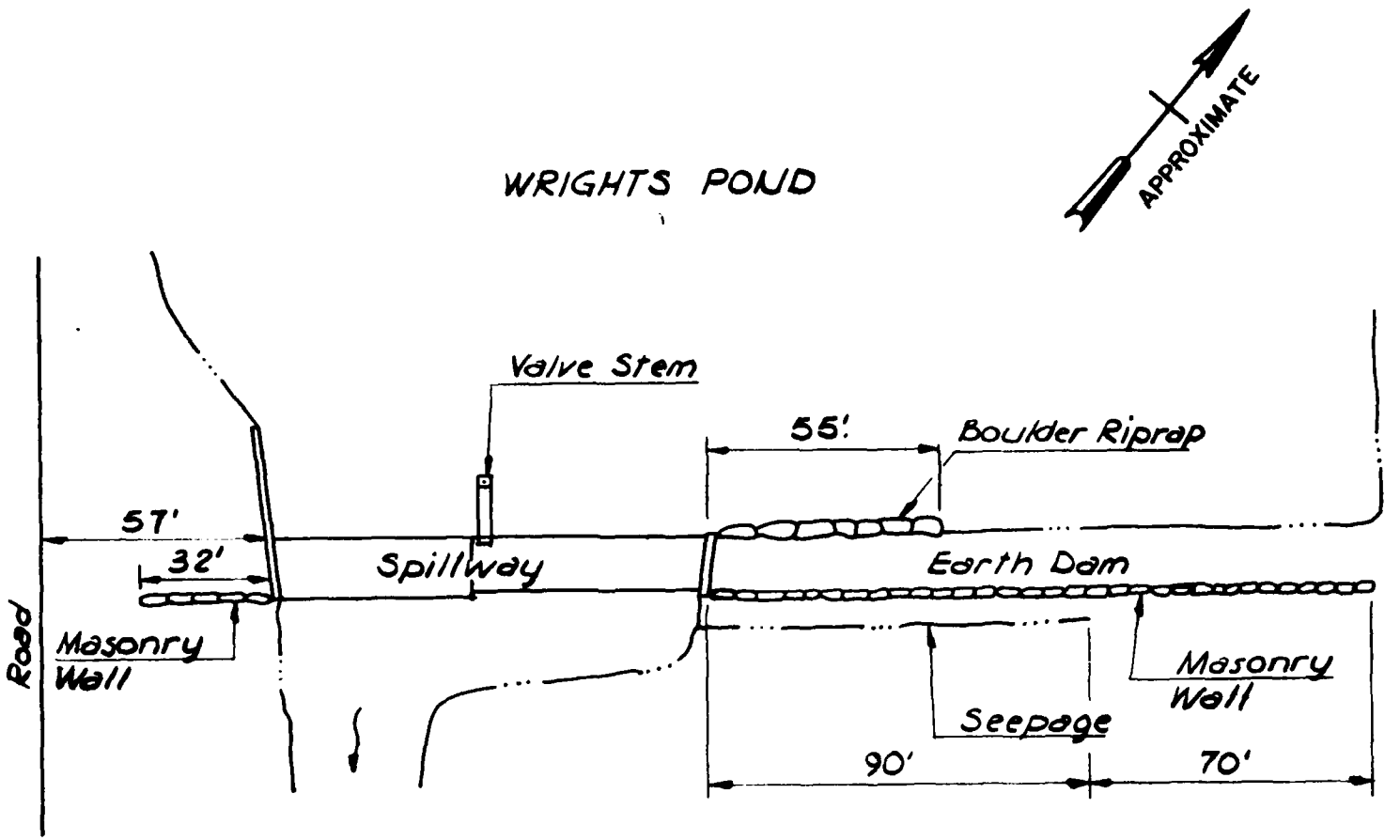
ELEVATION OF DAM - LOOKING UPSTREAM

SCALE: HORIZ - 1" = 40'
VERT - 1" = 20'

WRIGHTS POND DAM

JAMES P. PURCELL ASSOCIATES, INC.
ENGINEERS • ARCHITECTS • PLANNERS

WRIGHTS POND



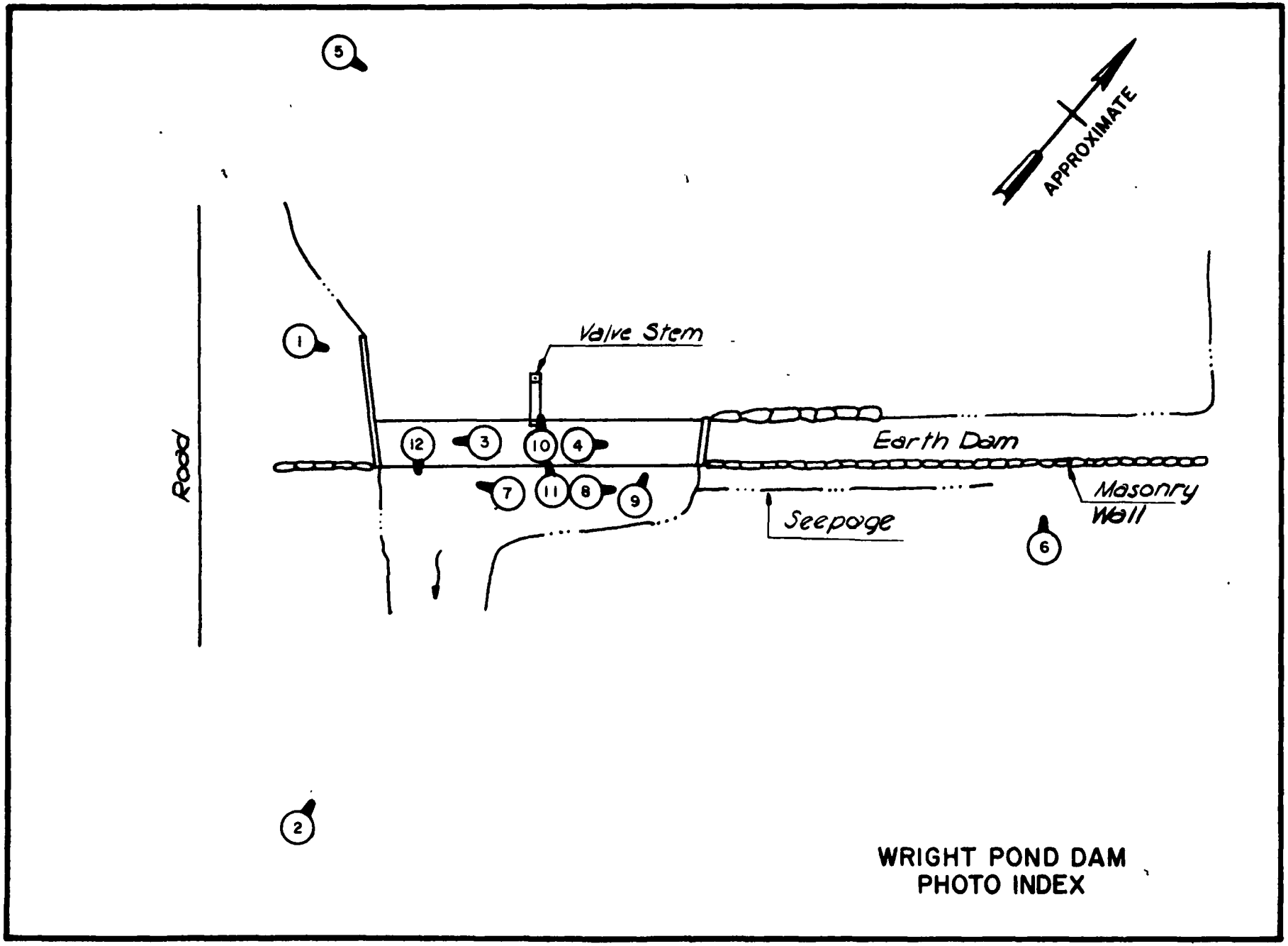
PLAN
SCALE: 1" = 40'

WRIGHTS POND DAM

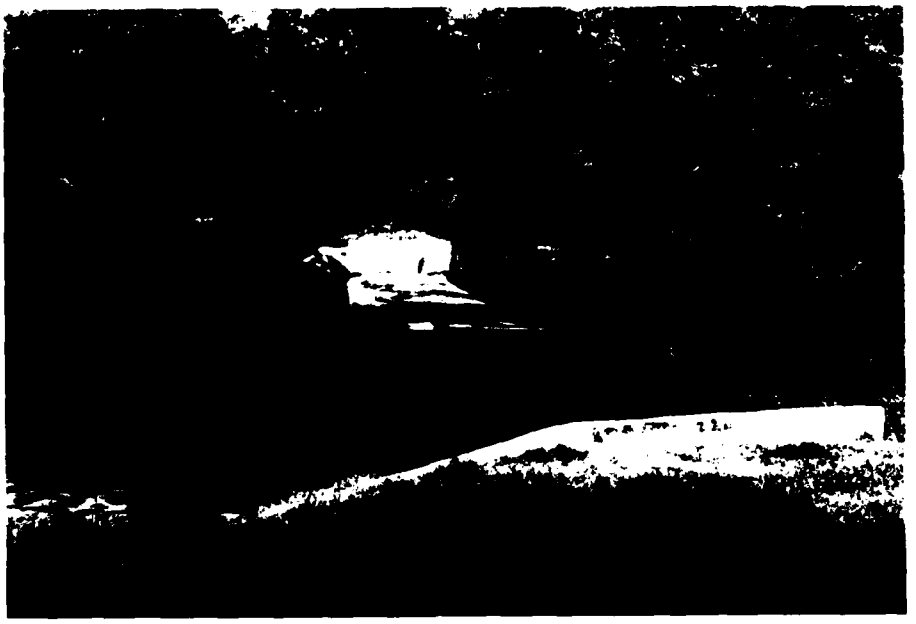
JAMES P. PURCELL ASSOCIATES, INC.
ENGINEERS • ARCHITECTS • PLANNERS

APPENDIX C

PHOTOGRAPHS

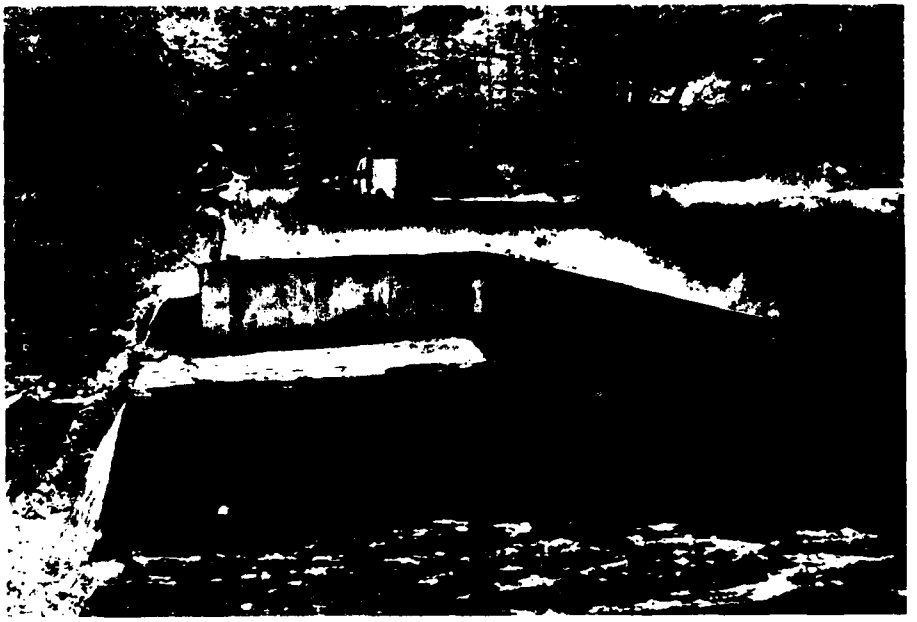


WRIGHT POND DAM
PHOTO INDEX



C-1 SPILLWAY LOOKING EAST

C-2 SPILLWAY LOOKING NORTH



C-3 WESTERN TRAINING WALL -
NEWER SPILLWAY SECTION

C-4 EASTERN END OF SPILLWAY -
OLDER SPILLWAY SECTION

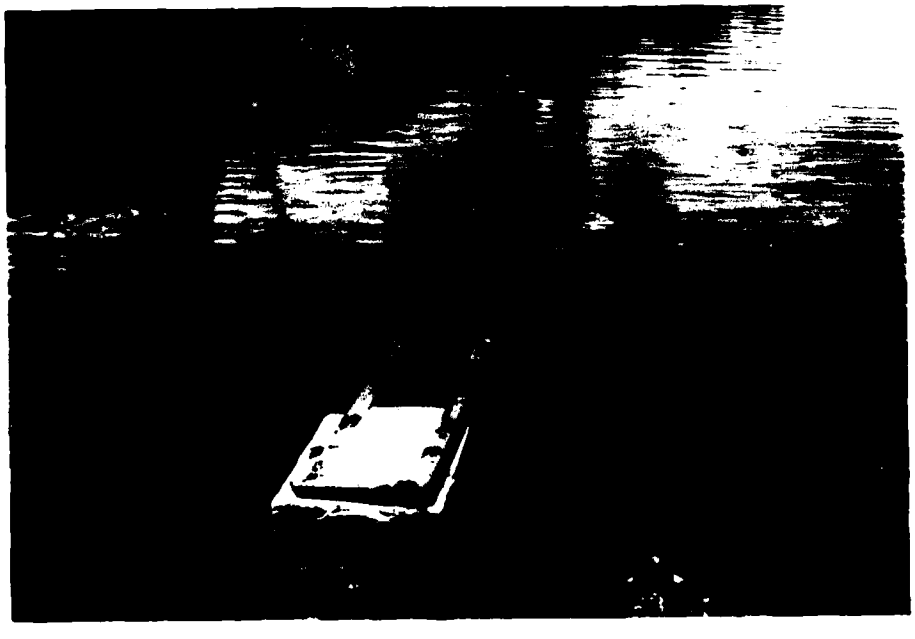
C-5 UPSTREAM FACE OF EARTH PORTION OF DAM AT EASTERN END

C-6 DOWNSTREAM FACE OF EARTH PORTION OF DAM AT EASTERN END

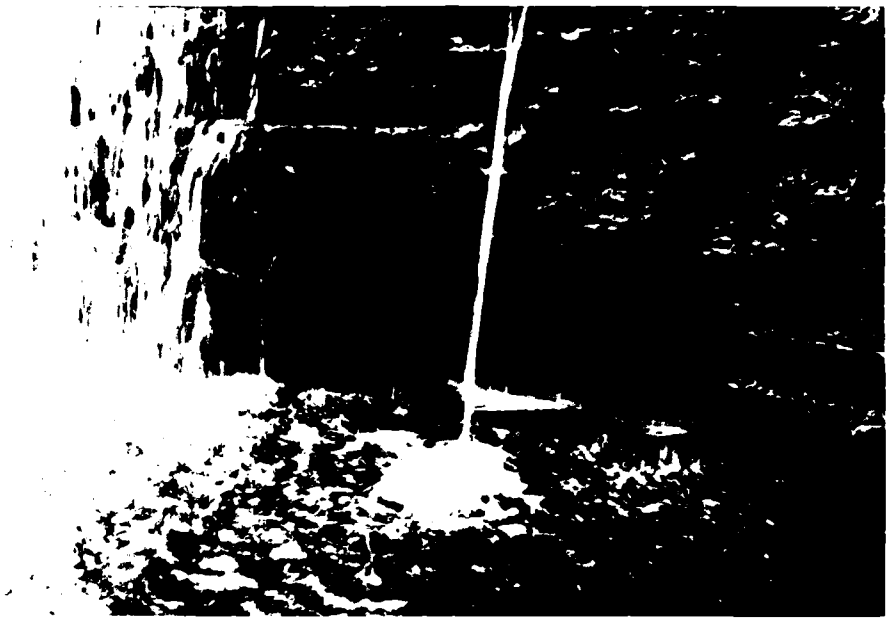
C-7 DOWNSTREAM FACE OF SPILLWAY - LOOKING WEST

C-8 DOWNSTREAM FACE OF SPILLWAY - LOOKING EAST

C-9 LOOSE AND MISSING STONES AND SEEPAGE ON DOWNSTREAM FACE OF SPILLWAY AT EASTERN END



C-10 VALVE STEM AND ANGLE IRON WALKWAY



C-11 MASONRY OPENING AT THE BASE OF THE DOWNSTREAM FACE OF THE SPILLWAY SECTION

C-12 DOWNSTREAM CHANNEL

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

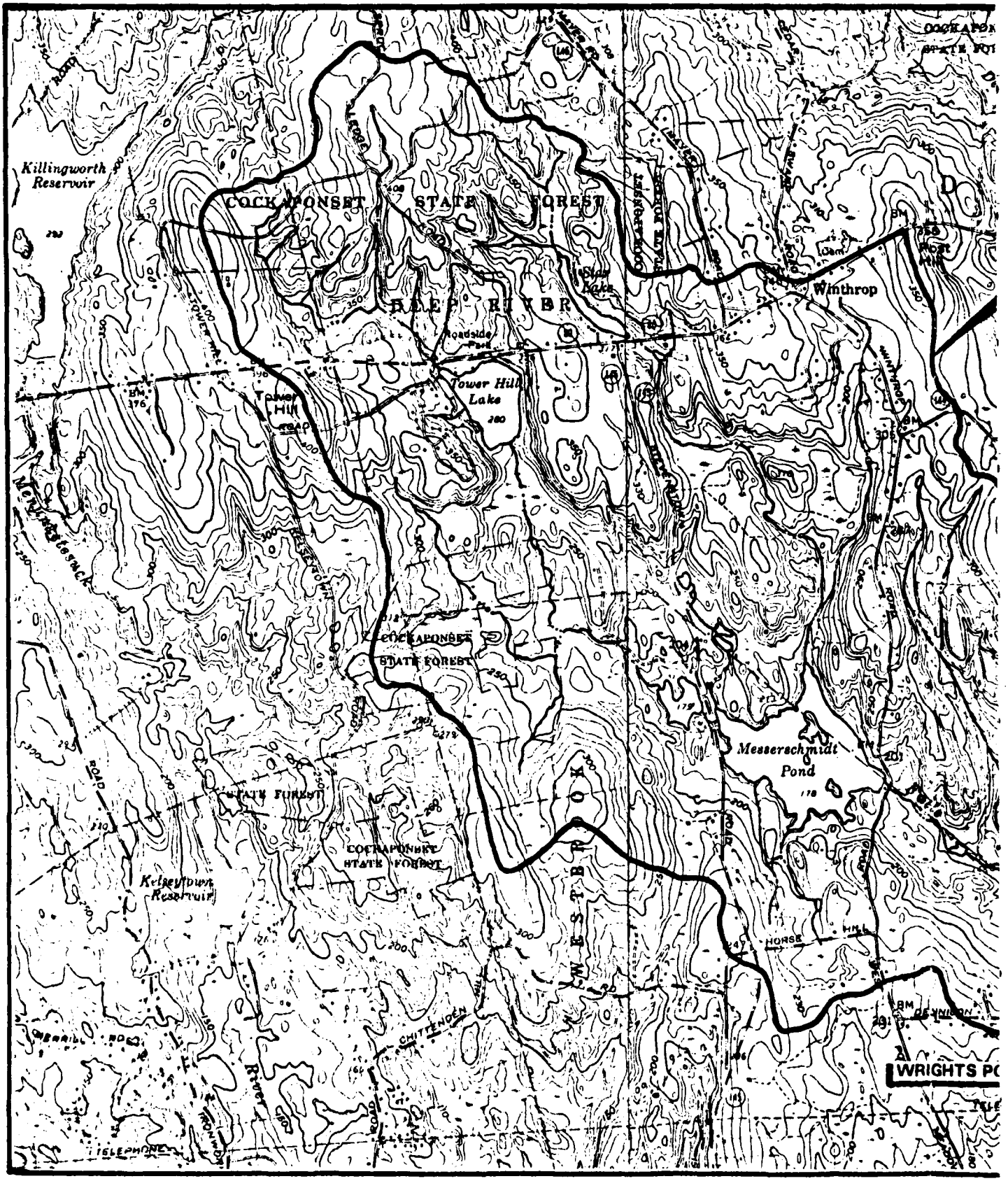
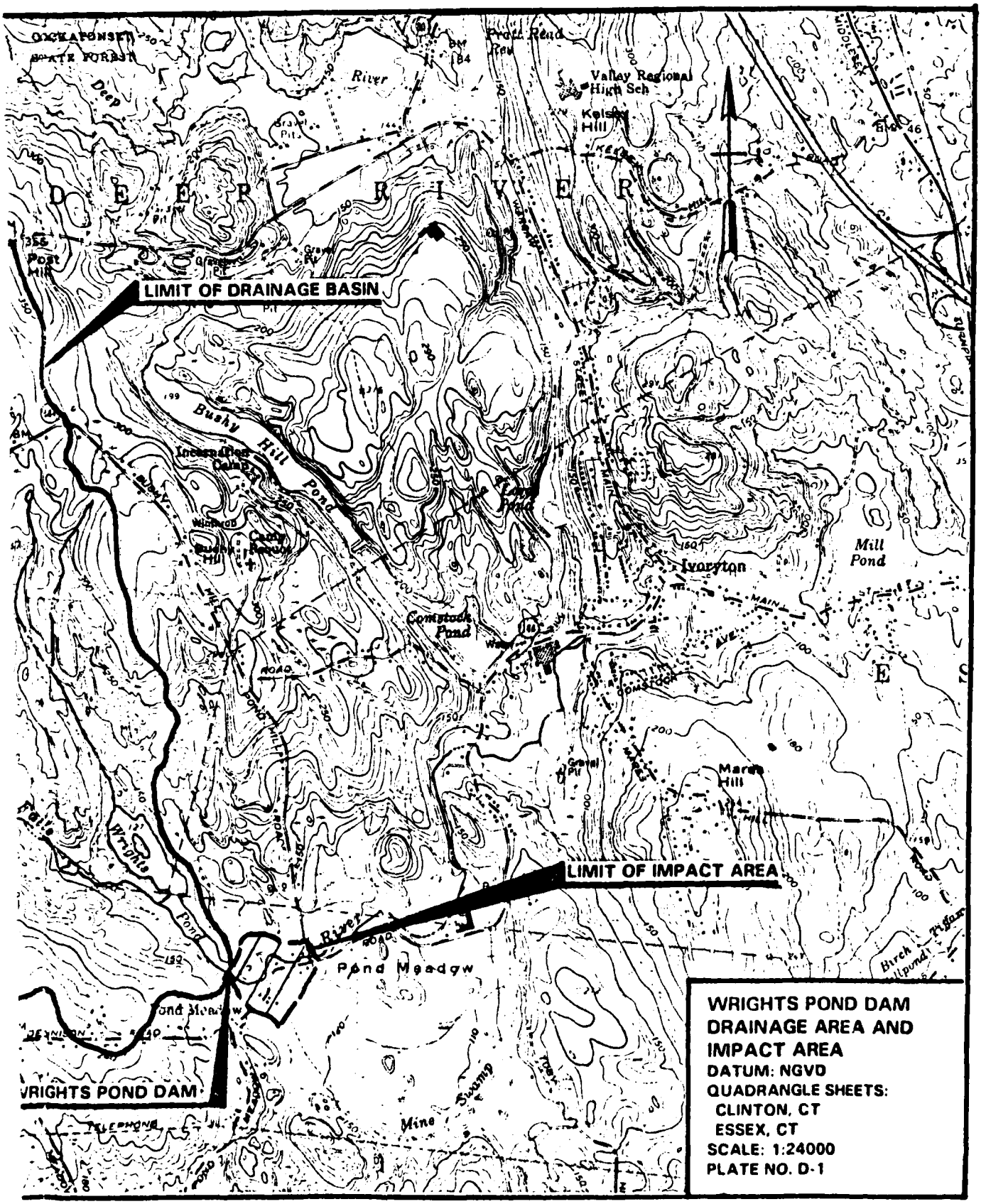


PLATE D-1

1 of 2


LIMIT OF DRAINAGE BASIN
LIMIT OF IMPACT AREA
WRIGHTS POND DAM
DEEP RIVER
Valley Regional High Sch
Kelsey Hill
Bushy Hill
Hill Pond
Comstock Pond
Ivoryton
Mill Pond
Marsh Hill
Pond Meadow
Wrights Pond
Birch Hill Pond
Swamp
Mine
WRIGHTS POND DAM DRAINAGE AREA AND IMPACT AREA
DATUM: NGVD
QUADRANGLE SHEETS:
CLINTON, CT
ESSEX, CT
SCALE: 1:24000
PLATE NO. D-1

HYDROLOGIC AND HYDRAULIC ANALYSIS
SUMMARY SHEET

Dam Wrights Pond Dam

Test Flood 1/2 PMF

INFLOW HYDROGRAPH DEVELOPMENT

Drainage Area 5.0 sq. mi.

Probable Maximum Precipation
24 hour - 200 square mile PMP 22.0 inches

Initial Rainfall Loss 0 Inch
Uniform Rainfall Loss .1 Inch

Snyder's Lag 3.7 hours
Snyder's Peaking Coefficient .625

Test Flood Inflow 4220 CFS

PMF Inflow 8440 CFS

RESERVOIR ROUTING AND DAM OVERTOPPING

Test Flood Outflow 4160 CFS

Spillway Capacity at Top of Dam 1060 CFS
25 % of Test Flood

Flow Over Spillway at Test Flood 2850 CFS

Spillway Crest Elevation 127.0 Feet
Top of Dam Elevation 129.3 Feet
Test Flood Elevation 131.4 Feet

```
**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  26 FEB 79
**********
    1                 A1       DAM SAFETY ANALYSIS - JOB NO. 80-100/09 ERJ
    2                 A2       WRIGHTS POND DAM WESTBROOK, CT.
    3                 A3       6-5-81
    4                 B      75        1        0        0        0        0        0        2        0        0
    5                 B1      5
    6                 J       1        3        1
    7                 J1    .25      .50     1.00
    8                 K                1                                                  1
    9                 K1       COMPUTATION OF PMF - DEVELOPMENT OF INFLOW HYDROGRAPH
   10                 M       1        1      5.0                5.0                                        1
   11                 P                     22.0      110      124      133      142
   12                 T                                                                          0.1
   13                 W     3.7    0.625
   14                 X     1.8    -0.05      2.0
   15                 K       1        1                                                  1
   16                 K1       ROUTING INFLOW HYDROGRAPH THRU POND - OVERTOPPING ANALYSIS
   17                 Y                                          1        1
   18                 Y1      1                                                          -1
   19                 $A     30       30
   20                 $E  127.0    129.3
   21                 $$  127.0    100.0     3.05      1.5
   22                 $D  129.3      2.6      1.5      160
   23                 K      99
```

FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION JULY 1978
LAST MODIFICATION 26 FEB 79
****

RUN DATE= 06/09/81.
TIME= 09.58.12.

DAM SAFETY ANALYSIS - JOB NO. 80-100/09 ERJ
WRIGHTS POND DAM WESTBROOK, CT.
6-5-81

JOB SPECIFICATION

NO	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
75	1	0	0	0	0	0	2	0	0

JOPER	NMT	LROPT	TRACE
5	0	0	0

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 3 LRTIO= 1

RTIOS= .25 .50 1.00

********** ********** ********** ********** **********

SUB-AREA RUNOFF COMPUTATION

COMPUTATION OF PMF - DEVELOPMENT OF INFLOW HYDROGRAPH

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	5.00	0.00	5.00	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	22.00	110.00	124.00	133.00	142.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .800

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	0.00	.10	0.00	0.00

UNIT HYDROGRAPH DATA
TP= 3.70 CP= .63 NTA= 0

RECESSION DATA
STRTQ= 1.80 QRCSN= -.05 RTIOR= 2.00
APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC= 4.26 AND R= 3.40 INTERVALS

UNIT HYDROGRAPH 21 END-OF-PERIOD ORDINATES, LAG= 3.72 HOURS, CP= .63 VOL= 1.00

67.	238.	430.	536.	493.	375.	279.	207.	154.	115.
85.	63.	47.	35.	26.	19.	14.	11.	8.	6.
4.									

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	1.00	1	.01	0.00	.01	2	1.03	14.00	38	2.32	2.23	.10	1308

1.00	1.00	1	.01	0.00	.01	2.	1.02	14.00	38	2.32	2.22	.10	1309.
1.01	2.00	2	.01	0.00	.01	2.	1.02	15.00	39	2.90	2.80	.10	2141.
1.01	3.00	3	.01	0.00	.01	1.	1.02	16.00	40	7.36	7.26	.10	3595.
1.01	4.00	4	.01	0.00	.01	1.	1.02	17.00	41	2.71	2.61	.10	5579.
1.01	5.00	5	.01	0.00	.01	1.	1.02	18.00	42	2.13	2.03	.10	7443.
1.01	6.00	6	.01	0.00	.01	1.	1.02	19.00	43	.16	.06	.10	8435.
1.01	7.00	7	.03	0.00	.03	1.	1.02	20.00	44	.16	.06	.10	8072.
1.01	8.00	8	.03	0.00	.03	1.	1.02	21.00	45	.16	.06	.10	6780.
1.01	9.00	9	.03	0.00	.03	1.	1.02	22.00	46	.16	.06	.10	5297.
1.01	10.00	10	.03	0.00	.03	1.	1.02	23.00	47	.16	.06	.10	4004.
1.01	11.00	11	.03	0.00	.03	1.	1.03	0.00	48	.16	.06	.10	3025.
1.01	12.00	12	.03	0.00	.03	1.	1.03	1.00	49	0.00	0.00	0.00	2294.
1.01	13.00	13	.13	.03	.10	3.	1.03	2.00	50	0.00	0.00	0.00	1739.
1.01	14.00	14	.16	.06	.10	12.	1.03	3.00	51	0.00	0.00	0.00	1312.
1.01	15.00	15	.20	.10	.10	34.	1.03	4.00	52	0.00	0.00	0.00	980.
1.01	16.00	16	.50	.40	.10	91.	1.03	5.00	53	0.00	0.00	0.00	728.
1.01	17.00	17	.18	.08	.10	188.	1.03	6.00	54	0.00	0.00	0.00	540.
1.01	18.00	18	.14	.04	.10	286.	1.03	7.00	55	0.00	0.00	0.00	418.
1.01	19.00	19	.01	0.00	.01	338.	1.03	8.00	56	0.00	0.00	0.00	390.
1.01	20.00	20	.01	0.00	.01	319.	1.03	9.00	57	0.00	0.00	0.00	363.
1.01	21.00	21	.01	0.00	.01	258.	1.03	10.00	58	0.00	0.00	0.00	339.
1.01	22.00	22	.01	0.00	.01	197.	1.03	11.00	59	0.00	0.00	0.00	316.
1.01	23.00	23	.01	0.00	.01	147.	1.03	12.00	60	0.00	0.00	0.00	295.
1.02	0.00	24	.01	0.00	.01	109.	1.03	13.00	61	0.00	0.00	0.00	275.
1.02	1.00	25	.11	.01	.10	82.	1.03	14.00	62	0.00	0.00	0.00	257.
1.02	2.00	26	.11	.01	.10	62.	1.03	15.00	63	0.00	0.00	0.00	240.
1.02	3.00	27	.11	.01	.10	49.	1.03	16.00	64	0.00	0.00	0.00	224.
1.02	4.00	28	.11	.01	.10	41.	1.03	17.00	65	0.00	0.00	0.00	209.
1.02	5.00	29	.11	.01	.10	35.	1.03	18.00	66	0.00	0.00	0.00	195.
1.02	6.00	30	.11	.01	.10	31.	1.03	19.00	67	0.00	0.00	0.00	182.
1.02	7.00	31	.41	.31	.10	48.	1.03	20.00	68	0.00	0.00	0.00	170.
1.02	8.00	32	.41	.31	.10	118.	1.03	21.00	69	0.00	0.00	0.00	158.
1.02	9.00	33	.41	.31	.10	247.	1.03	22.00	70	0.00	0.00	0.00	148.
1.02	10.00	34	.41	.31	.10	409.	1.03	23.00	71	0.00	0.00	0.00	138.
1.02	11.00	35	.41	.31	.10	559.	1.04	0.00	72	0.00	0.00	0.00	129.
1.02	12.00	36	.41	.31	.10	672.	1.04	1.00	73	0.00	0.00	0.00	120.
1.02	13.00	37	1.94	1.84	.10	857.	1.04	2.00	74	0.00	0.00	0.00	112.
							1.04	3.00	75	0.00	0.00	0.00	104.
									SUM	24.99	21.72	3.27	73260.
										(635.)	(552.)	(83.)	(2074.49)

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	8435.	6803.	2788.	1017.	73205.
CMS	239.	193.	79.	29.	2073.
INCHES		12.66	20.75	22.70	22.70
MM		321.49	526.95	576.53	576.56
AC-FT		3373.	5529.	6050.	6050.
THOUS CU M		4161.	6820.	7462.	7463.

DVP

STATION 1

INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(*)

0.	1000.	2000.	3000.	4000.	5000.	6000.	7000.	8000.	9000.	0.	0.	0.
										PRECIP(L) AND EXCESS(X)		
0.	0.	0.	0.	0.	0.	0.	0.	8.	6.	4.	2.	0.
1.00 11												L
2.00 21												L
3.00 31												L
4.00 41												L
5.00 51												L
6.00 61												L
7.00 71												L
8.00 81												L
9.00 91												L
10.00 101												L
11.00 111												L
12.00 121												L
13.00 131												LX
14.00 141												LX
15.00 151												LX
16.00 16.I												LXX
17.00 17. I												LX
18.00 18. I												LX
19.00 19. I												L
20.00 20.I												L
21. 21. I												L
22. 22. I												L
23. 23.I												L
0.00 24.I												L
1.00 25.I												LX
2.00 26.I												LX
3.00 27I												LX
4.00 28I												LX
5.00 29I												LX
6.00 30I												LX
7.00 31I												LXX
8.00 32.I												LXX
9.00 33. I												LXX
10.00 34. I												LXX
11.00 35. I												LXX
12.00 36. I												LXX
13.00 37. I												LXXXXXXXXXX
14.00 38. I												LXXXXXXXXXXX
15.00 39. I												LXXXXXXXXXXXXX
16.00 40. I												LXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
17.00 41. I												LXXXXXXXXXXXXX
18.00 42. I												LXXXXXXXXXX
19.00 43. I												LX
20.00 44. I												LX
21.00 45. I												LX
22.00 46. I												LX
23.00 47. I												LX
0.00 48. I												LX
1.00 49. I												L
2.00 50. I												L
3.00 51. I												L
4.00 52. I												L
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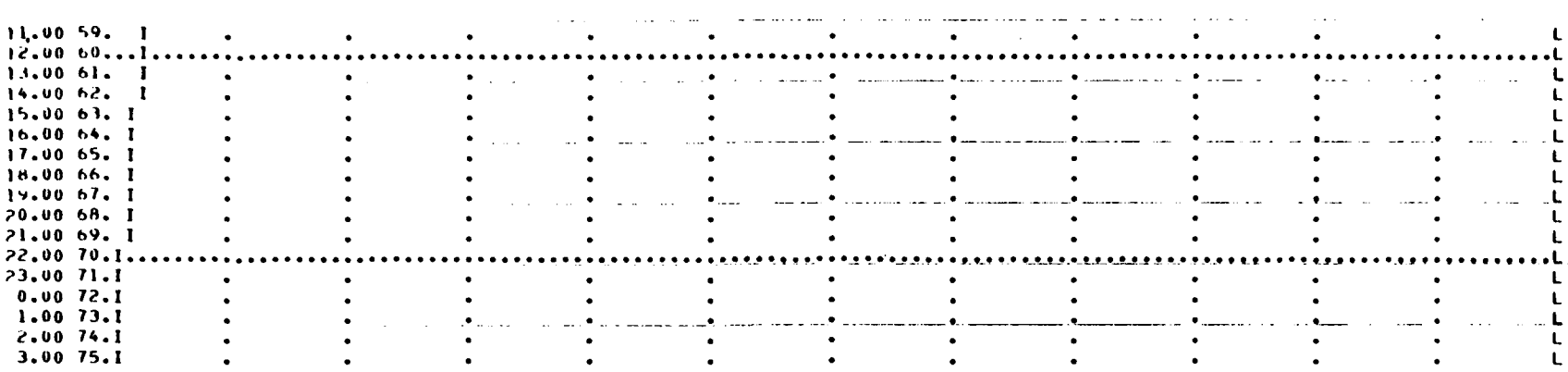
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21.00 69. I
22.00 70. I
23.00 71. I
0.00 72. I
1.00 73. I
2.00 74. I
3.00 75. I

OVN

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 1

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	1.	3.	8.	23.	47.	71.	84.	80.
64.	49.	37.	27.	20.	16.	12.	10.	9.	8.
12.	29.	62.	102.	140.	168.	214.	327.	535.	899.
1395.	1861.	2109.	2018.	1695.	1324.	1001.	756.	573.	435.
328.	245.	182.	135.	104.	97.	91.	85.	79.	74.
69.	64.	60.	56.	52.	49.	45.	42.	40.	37.
34.	32.	30.	28.	26.					

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2109.	1701.	697.	254.	18301.
CMS	60.	48.	20.	7.	518.
INCHES		3.16	5.19	5.67	5.67
MM		80.37	131.74	144.13	144.14
AC-FT		843.	1382.	1512.	1512.
THOUS CU M		1040.	1705.	1866.	1866.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 2

1.	1.	1.	1.	1.	1.	1.	1.	0.	0.
0.	0.	1.	6.	17.	46.	94.	143.	169.	159.
129.	98.	73.	55.	41.	31.	25.	20.	17.	15.
24.	59.	124.	205.	279.	336.	428.	654.	1071.	1797.
2789.	3721.	4218.	4036.	3390.	2649.	2002.	1513.	1147.	869.
656.	490.	364.	270.	209.	195.	182.	170.	158.	148.
138.	129.	120.	112.	104.	97.	91.	85.	79.	74.
69.	64.	60.	56.	52.					

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	4218.	3402.	1394.	508.	36602.
CMS	119.	96.	39.	14.	1036.
INCHES		6.33	10.37	11.35	11.35
MM		160.75	263.48	288.27	288.28
AC-FT		1687.	2765.	3025.	3025.
THOUS CU M		2081.	3410.	3731.	3731.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 3

2.	2.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	3.	12.	34.	91.	188.	286.	338.	319.
258.	197.	147.	109.	82.	62.	49.	41.	35.	31.
48.	118.	247.	409.	559.	672.	857.	1308.	2141.	3595.
5579.	7443.	8435.	8072.	6780.	5297.	4004.	3025.	2294.	1739.
1312.	980.	728.	540.	418.	390.	363.	339.	316.	295.
275.	257.	240.	224.	209.	195.	182.	170.	158.	148.
138.	129.	120.	112.	104.					

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	8435.	6803.	2788.	1017.	73205.
CMS	239.	193.	79.	29.	2073.
INCHES		12.66	20.75	22.70	22.70
MM		321.49	526.95	576.53	576.56
AC-FT		3373.	5529.	6050.	6050.
THOUS CU M		4161.	6820.	7462.	7463.

****

ROUTING INFLOW HYDROGRAPH THRU POND - OVERTOPPING ANALYSIS

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

SURFACE AREA=	30.	30.
CAPACITY=	0.	69.
ELEVATION=	127.	129.

CREL	SPWID	COOW	EXPW	ELEVL	COOL	CAREA	EXPL
127.0	100.0	3.1	1.5	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
129.3	2.6	1.5	160.

STATION 1, PLAN 1, RATIO 1

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	1.	4.	14.	33.	55.	70.
71.	63.	53.	42.	34.	27.	21.	17.	14.	12.
11.	15.	27.	54.	91.	130.	171.	242.	389.	671.
1126.	1731.	2060.	2065.	1794.	1437.	1117.	883.	681.	525.
404.	310.	237.	181.	140.	115.	102.	94.	87.	81.
76.	71.	66.	62.	58.	54.	50.	47.	44.	41.
39.	36.	34.	32.	30.					

STORAGE

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	1.	2.	4.	7.	10.	11.
11.	11.	9.	8.	7.	6.	5.	4.	4.	4.
3.	4.	6.	9.	13.	17.	20.	26.	35.	51.
71.	88.	95.	95.	89.	80.	71.	61.	51.	43.
36.	30.	25.	21.	18.	16.	14.	14.	13.	12.
12.	11.	11.	10.	10.	9.	9.	9.	8.	8.
8.	7.	7.	7.	6.					

STAGE

127.0	127.0	127.0	127.0	127.0	127.0	127.0	127.0	127.0	127.0
127.0	127.0	127.0	127.0	127.0	127.1	127.1	127.2	127.3	127.4
127.4	127.4	127.3	127.3	127.2	127.2	127.2	127.1	127.1	127.1
127.1	127.1	127.2	127.3	127.4	127.6	127.7	127.9	128.2	128.7
129.4	129.9	130.2	130.2	130.0	129.7	129.4	129.0	128.7	128.4
128.2	128.0	127.8	127.7	127.6	127.5	127.5	127.5	127.4	127.4
127.4	127.4	127.4	127.3	127.3	127.3	127.3	127.3	127.3	127.3
127.3	127.2	127.2	127.2	127.2					

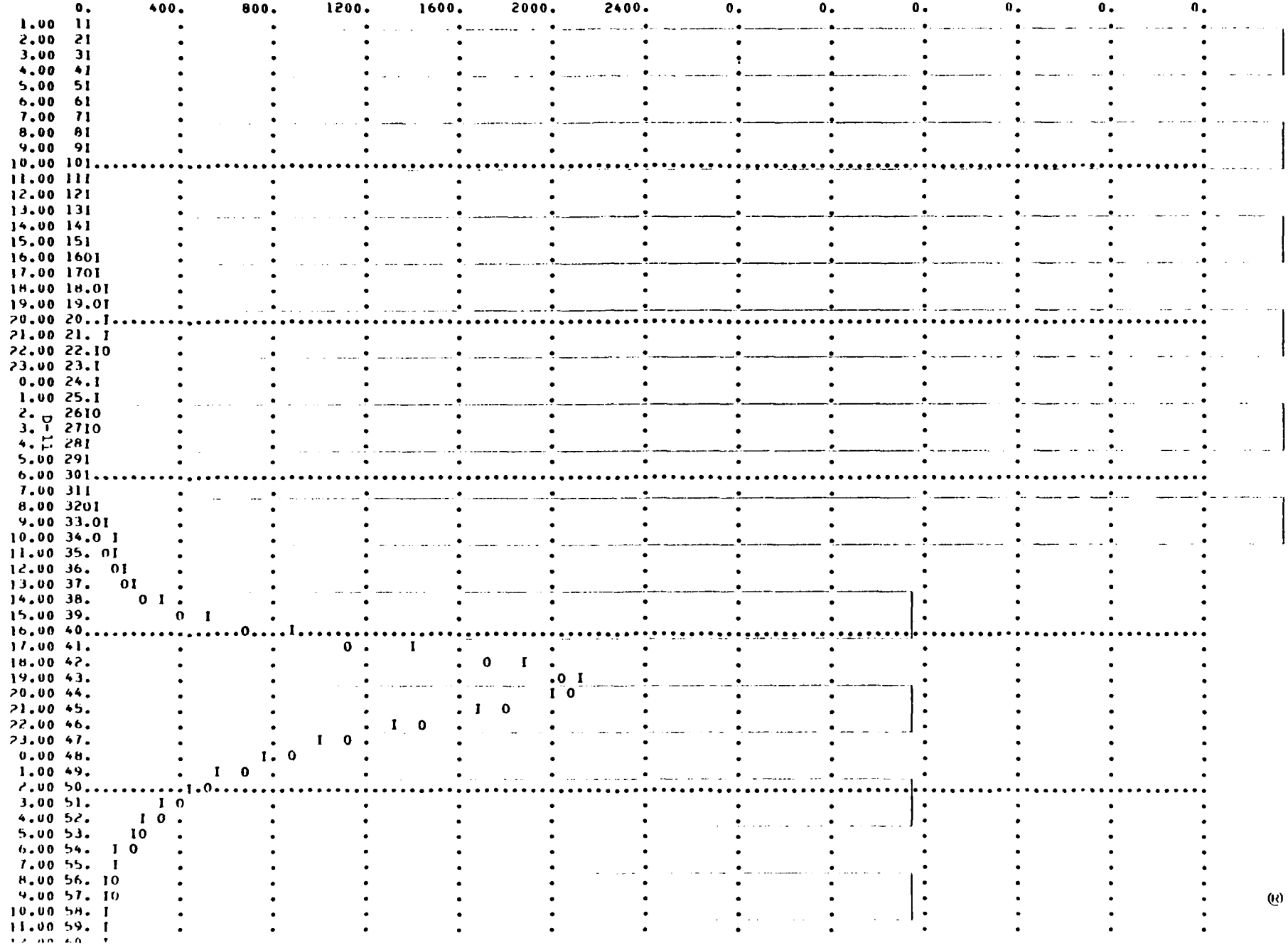
PEAK OUTFLOW IS 2065. AT TIME 44.00 HOURS

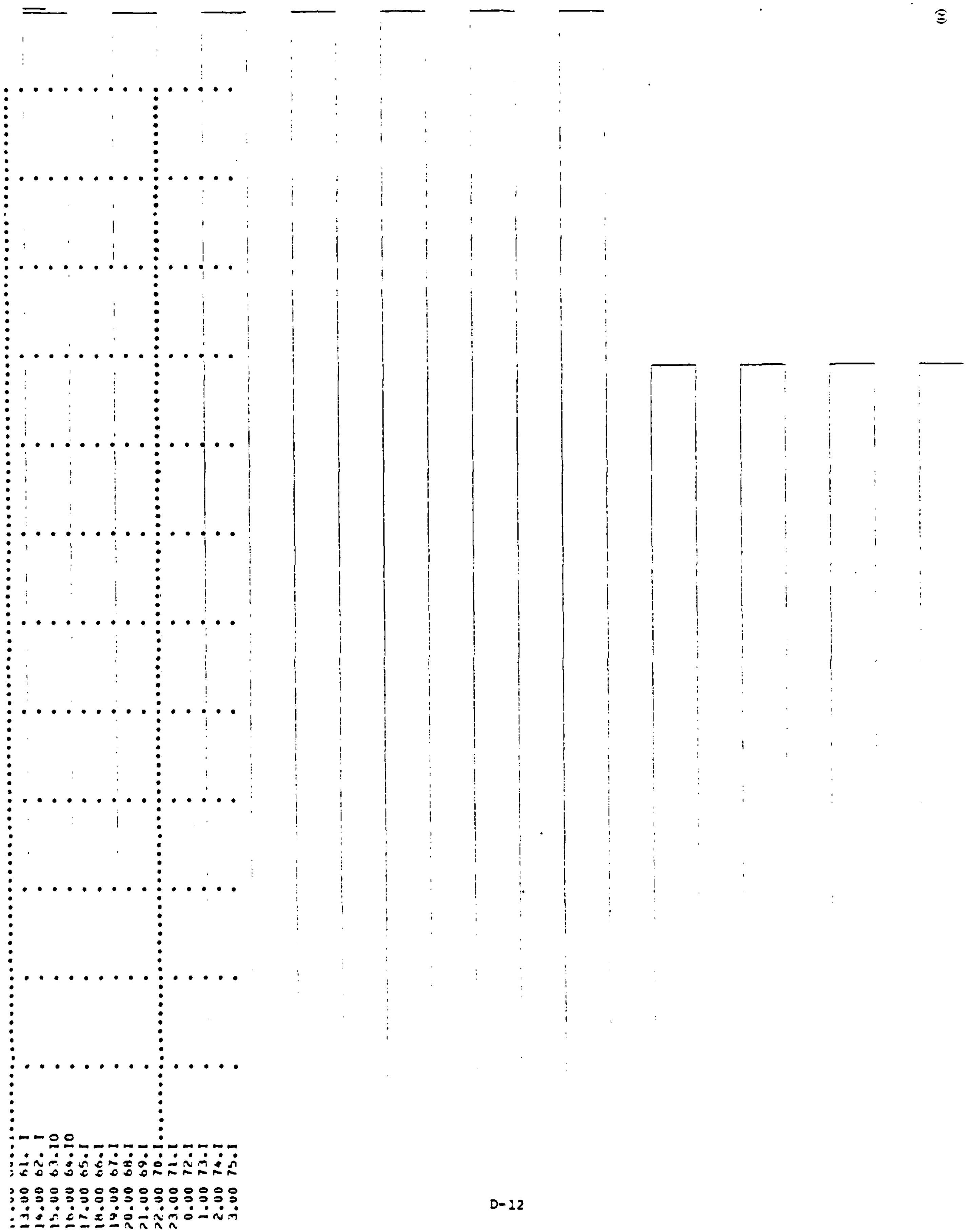
	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2065.	1701.	696.	253.	18229.
CMS	58.	48.	20.	7.	516.

CMS	SNOW	40.	20.	0.	510.
INCHES		3.17	5.18	5.65	5.65
MM		80.40	131.48	143.57	143.57
AC-FT		844.	1380.	1507.	1507.
THOUS CU M		1041.	1702.	1858.	1858.

STATION 1

INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(*)

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21.00 69.I
22.00 70.I
23.00 71.I
0.00 72.I
1.00 73.I
2.00 74.I
3.00 75.I

DVN

STATION 1, PLAN 1, RATIO 2

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	1.	3.	11.	36.	79.	126.	151.
146.	125.	101.	79.	62.	48.	38.	31.	26.	22.
21.	30.	60.	121.	203.	280.	360.	510.	826.	1479.
2541.	3534.	4157.	4114.	3541.	2812.	2154.	1640.	1262.	991.
775.	592.	450.	342.	263.	218.	197.	182.	170.	158.
148.	138.	129.	121.	113.	106.	99.	92.	86.	81.
75.	71.	66.	62.	58.					

STORAGE

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	1.	1.	3.	7.	12.	17.	19.
18.	17.	14.	12.	10.	9.	7.	7.	6.	5.
5.	6.	10.	16.	23.	28.	33.	42.	58.	82.
105.	123.	133.	133.	123.	110.	97.	86.	76.	66.
56.	47.	39.	32.	27.	24.	22.	21.	20.	19.
19.	18.	17.	16.	15.	15.	14.	14.	13.	12.
12.	11.	11.	10.	10.					

STAGE

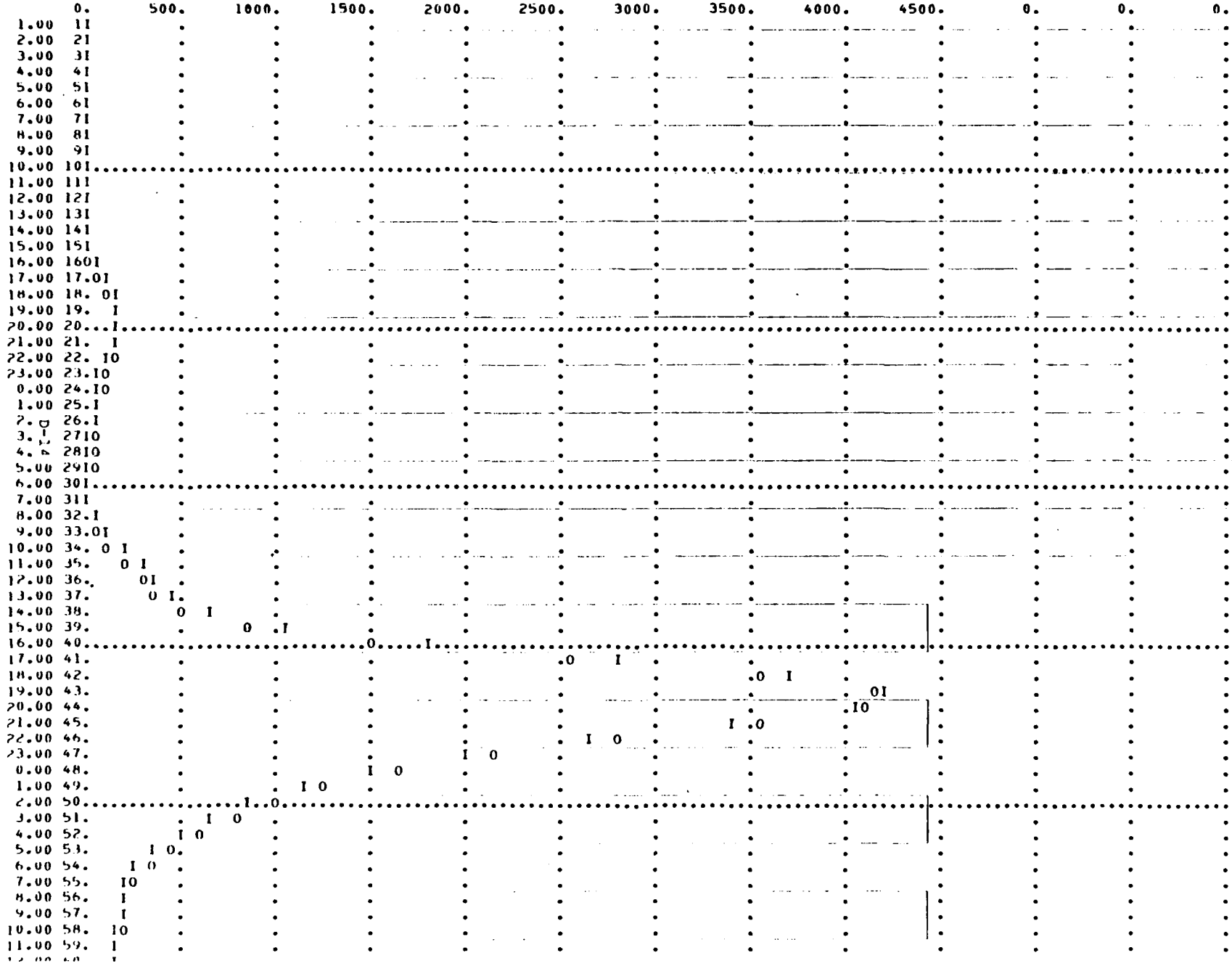
127.0	127.0	127.0	127.0	127.0	127.0	127.0	127.0	127.0	127.0
127.0	127.0	127.0	127.0	127.0	127.1	127.2	127.4	127.6	127.6
127.6	127.6	127.5	127.4	127.3	127.3	127.2	127.2	127.2	127.2
127.2	127.2	127.3	127.5	127.8	127.9	128.1	128.4	128.9	129.7
130.5	131.1	131.4	131.4	131.1	130.7	130.2	129.9	129.5	129.2
128.9	128.6	128.3	128.1	127.9	127.8	127.7	127.7	127.7	127.6
127.6	127.6	127.6	127.5	127.5	127.5	127.5	127.5	127.4	127.4
127.4	127.4	127.4	127.3	127.3					

PEAK OUTFLOW IS 4157. AT TIME 43.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	4157.	3417.	1392.	507.	36487.
CMS	118.	97.	39.	14.	1033.
INCHES		6.36	10.36	11.31	11.31
MM		161.49	263.11	287.37	287.37
AC-FT		1695.	2761.	3015.	3015.
THOUS CU M		2090.	3405.	3719.	3719.

STATION 1

INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(*)



```
13.00 61.  I
14.00 62.  I
15.00 63. 10
16.00 64. I
17.00 65. I
18.00 66. I
19.00 67. I
20.00 68. I
21.00 69. I
22.00 70.10
23.00 71.10
 0.00 72.I
 1.00 73.I
 2.00 74.I
 3.00 75.I
```

DVN

STATION 1, PLAN 1, RATIO 3

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	0.	0.	1.	1.	1.	1.	1.	1.
1.	1.	1.	2.	8.	29.	87.	184.	277.	316.
295.	244.	192.	148.	114.	89.	70.	56.	47.	40.
40.	62.	134.	271.	440.	590.	747.	1066.	1860.	3225.
5188.	7170.	8346.	8205.	7017.	5549.	4232.	3210.	2452.	1875.
1434.	1100.	861.	653.	501.	419.	385.	358.	334.	312.
292.	272.	255.	238.	222.	208.	194.	181.	169.	158.
148.	138.	129.	121.	113.					

STORAGE

0.	0.	0.	0.	0.	1.	1.	1.	1.	1.
1.	1.	1.	1.	3.	6.	13.	21.	28.	31.
29.	26.	22.	19.	16.	13.	11.	10.	9.	8.
8.	10.	17.	28.	38.	47.	55.	69.	91.	118.
149.	176.	191.	190.	174.	154.	134.	117.	103.	91.
80.	70.	60.	50.	42.	37.	35.	33.	32.	30.
29.	28.	27.	25.	24.	23.	22.	21.	20.	19.
19.	18.	17.	16.	15.					

STAGE

127.0	127.0	127.0	127.0	127.0	127.0	127.0	127.0	127.0	127.0
127.0	127.0	127.0	127.0	127.1	127.2	127.4	127.7	127.9	128.0
128.0	127.9	127.7	127.6	127.5	127.4	127.4	127.3	127.3	127.3
127.3	127.3	127.6	127.9	128.3	128.6	128.8	129.3	130.0	130.9
132.0	132.9	133.4	133.3	132.8	132.1	131.5	130.9	130.4	130.0
129.7	129.3	129.0	128.7	128.4	128.2	128.2	128.1	128.1	128.0
128.0	127.9	127.9	127.8	127.8	127.8	127.7	127.7	127.7	127.6
127.6	127.6	127.6	127.5	127.5					

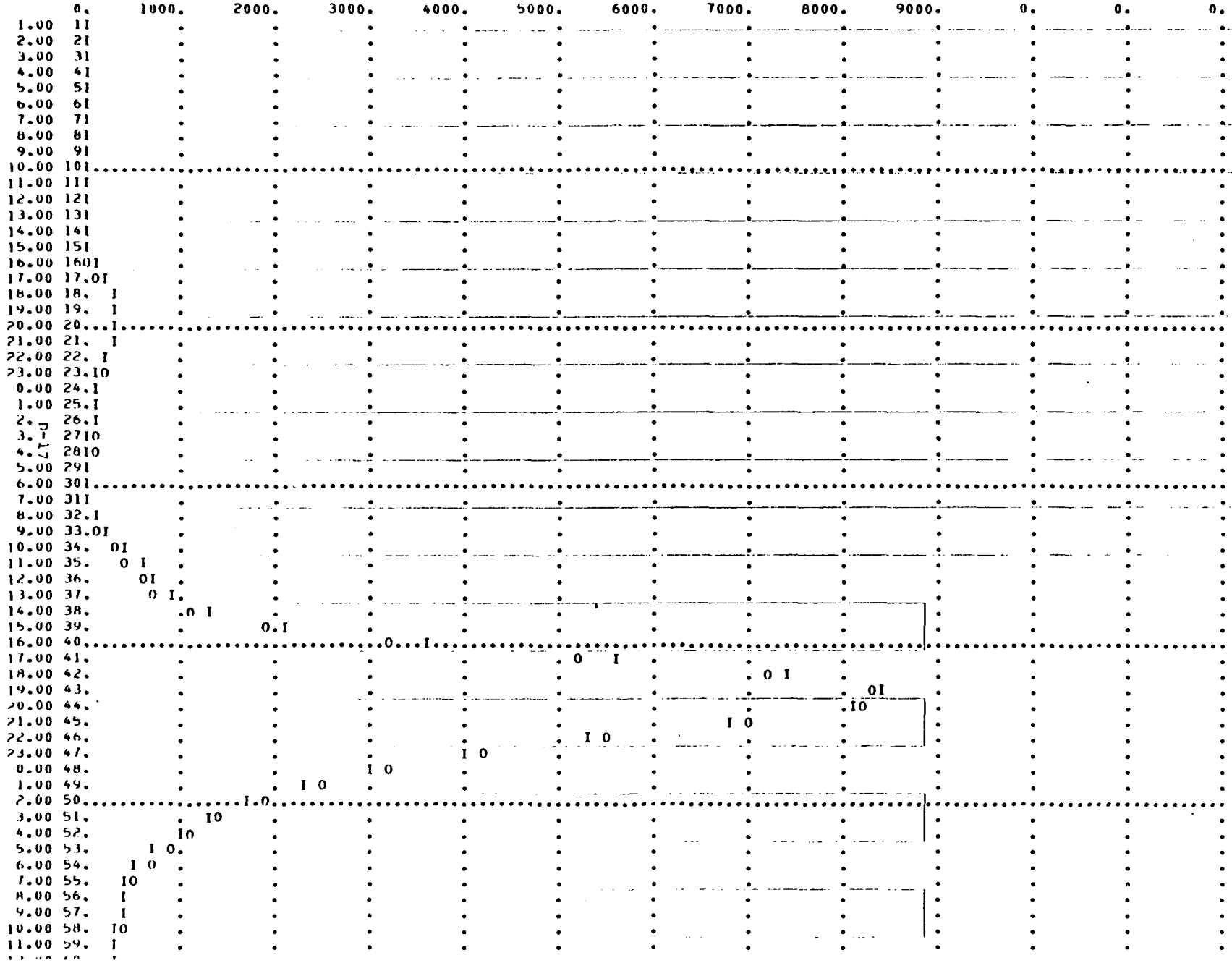
PEAK OUTFLOW IS 8346. AT TIME 43.00 HOURS

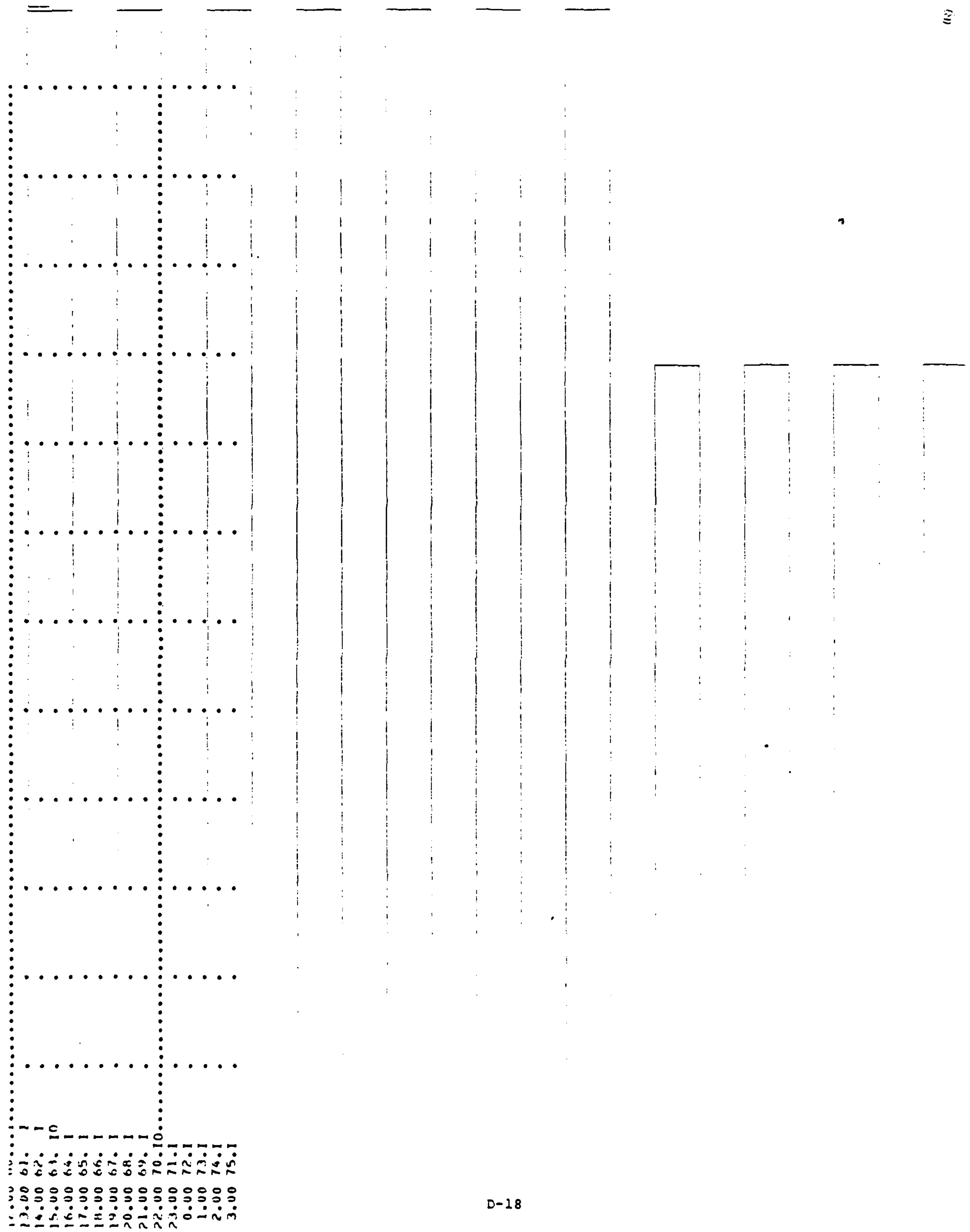
	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	8346.	6833.	2785.	1014.	73023.
CMS	236.	193.	79.	29.	2068.
INCHES		12.71	20.73	22.64	22.64
MM		322.88	526.42	575.12	575.12
AC-FT		3388.	5524.	6035.	6035.
THOUS CU M		4179.	6814.	7444.	7444.

OVF

STATION 1

INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(*)





13.00 61. I
14.00 62. I
15.00 63. I0
16.00 64. I
17.00 65. I
18.00 66. I
19.00 67. I
20.00 68. I
21.00 69. I
22.00 70.I0
23.00 71.I
0.00 72.I
1.00 73.I
2.00 74.I
3.00 75.I

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1 .25	RATIO 2 .50	RATIO 3 1.00
HYDROGRAPH AT	1	5.00	1	2109.	4218.	8435.
		(12.95)		(59.71)	(119.43)	(238.86)
ROUTED TO	1	5.00	1	2065.	4157.	8346.
		(12.95)		(58.46)	(117.71)	(236.33)

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	127.00	127.00	129.30
STORAGE	0.	0.	69.
OUTFLOW	0.	0.	1064.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.25	130.17	.87	95.	2065.	7.00	44.00	0.00
.50	131.44	2.14	133.	4157.	10.00	43.00	0.00
1.00	133.38	4.08	191.	8346.	15.00	43.00	0.00

Dam Failure Analysis

1. Failure discharge with pool at Top of Dam (elev. 129.3) = 3300* CFS
2. Depth of water in reservoir at time of failure = 12.0 ft.
3. Maximum depth of flow downstream of dam = 12.0 ft.
4. Water surface elevation just downstream of dam at time of failure) = 129.5

The failure discharge of 3300 CFS will enter and flow downstream 5500 feet until the brook Joins Mine Swamp Brook **. Valley storage in this 5500 feet length of brook is significant in reducing the discharge. Also due to roughness characteristics, obstructions and frictional losses, it is very likely that the unsteady dam failure flow will dissipate its wave and kinetic energy and thus convert to steady and uniform flow obeying Manning's formulae 5500 feet downstream. The failure profile will have the following hydraulic characteristics:

DISTANCE FROM THE DAM	WATER SURFACE ELEVATION	DEPTH (ft.)	REMARKS
0	129.3	12.0	at dam
500	122.3	2.3	
1500	121.2	1.2	
3000	111.2	1.2	
4500	111.1	1.1	
5500	111.0	1.0	confluence with Mine Swamp Brook

NOTES:

* Including prefailure spillway flow of 1060 cfs.

** At this point, the failure discharge has disipated with only the prefailure spillway flow remaining.

"Rule of Thumb" Guidance for Estimating
Downstream Dam Failure Analysis

DATA

Name of Dam Wrights Pond Dam

Location Westbrook, Conn.

Drainage Area 5.0 sq. mi., Top of Dam 129.3

Spillway Type Broad, Crest of Spillway 127.0

Surface Area @ Crest Elev. 30 Acres = .05 sq. mi.

Pool Bottom Near Dam = 118.0

Assumed Side Slopes of Embankments = 2:1

Depth of Pool at Dam (Yo) = 12.0 Feet

Mid-Height Elev. 122.5

Length of Dam at Crest = 160 Feet (Earth portion only)

Length of Dam at Mid-Height = 80 Feet

40% of Dam Length at Mid-Height = W_b = 32 Feet

Step 1

Storage (S) at time of failure 200 Ac-FT

Step 2

Peak Failure Discharge

$$Q_{pl} = 8/27\ W_b \sqrt{g}\ Yo^{3/2}$$

$$= (1.68)\ (^{W}b)\ (^{Y}o)^{3/2} = 2240 \text{ cfs}^*$$

Failure is assumed to coincide with pool elevation at top of dam

NOTES:

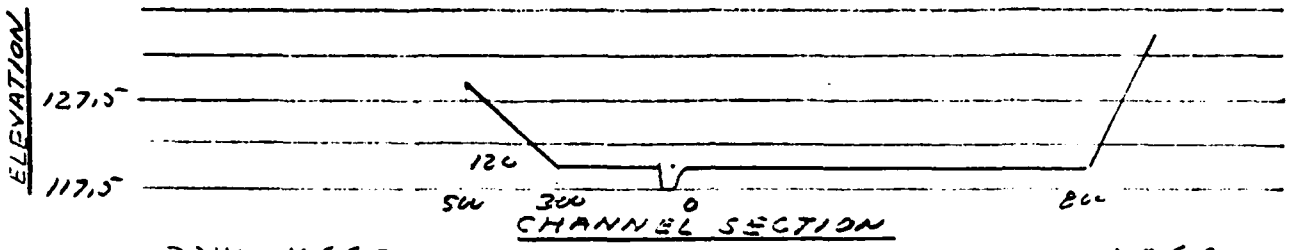
*The total discharge is 3300 cfs which includes the prefailure spillway flow of 1060 cfs.

BY JR DATE 6/1/81 SUBJECT DAM INSPECTION STUDY SHEET NO. 1 OF 4
CHKD. BY ERJ DATE 6/5/81 JOB NO. 80-100/09
DAM FAILURE ANALYSIS
PURCELL ASSOCIATES ENGINEERS • ARCHITECTS • PLANNERS

DAM WRIGHTS POND DAM

SECTION 500 FEET DOWNSTREAM

USING $Q = \frac{1.486}{n} A R^{2/3} S_L^{1/2}$ $n =$ .05 SLOPE (S_L) = .001 ft/ft



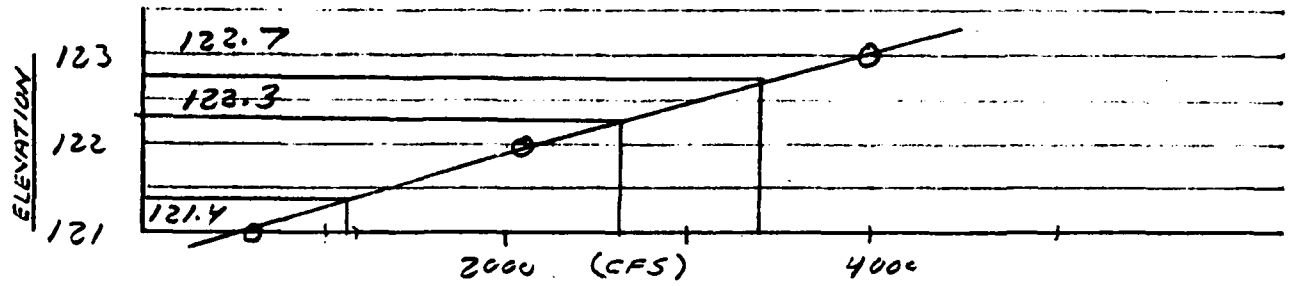
2240+1060 =

Q_{P_1} = 3300 CFS

FULL SPILLWAY Q_S = 1060 CFS

TOTAL STORAGE (S) = 200 AC-FT

ELEV	AREA	WP	R	Q	DEPTH
121	1100	1100	1	650	1
122	2200	1100	2	2051	2
123	3300	1100	3	4030	3



$V_1 = \left(\frac{9 + 2.7}{2}\right)\left(\frac{32}{1} + \frac{1100}{1}\right)\left(\frac{500}{43560}\right)\left(\frac{1}{2}\right)$ = 38 AC-FT

$Q_{P_2} = Q_{P_1}(1 - V_1/S)$ = 2670 CFS V_{AVG} = 37

$V_2 = \left(\frac{9 + 2.3}{2}\right)(6.5)$ = 36 AC-FT

$Q_{P_2} = Q_{P_1}(1 - V_{AVG}/S)$ = 2690 CFS ELEV = 122.3

2690-1060 = 1630 DEPTH = 2.3

FULL SPILLWAY ± DEPTH = 1.4

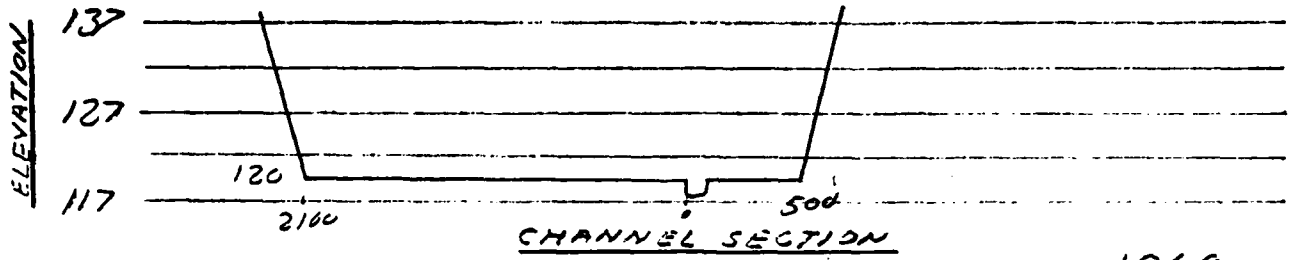
INCREASE DUE TO DAM FAILURE = 0.9

BY JR DATE 6/1/81 SUBJECT DAM INSPECTION STUDY SHEET NO. 2 OF 4
CHKD. BY ERJ DATE 6/5/81 JOB NO. 80-100/09
DAM FAILURE ANALYSIS
PURCELL ASSOCIATES ENGINEERS • ARCHITECTS • PLANNERS

DAM WRIGHTS POND DAM.

SECTION 1500 FEET DOWNSTREAM

USING $Q = \frac{1.486}{n} A R^{2/3} S_L^{1/2}$ $n =$ .08 SLOPE (S_L) = .0005 ft/ft



CHANNEL SECTION

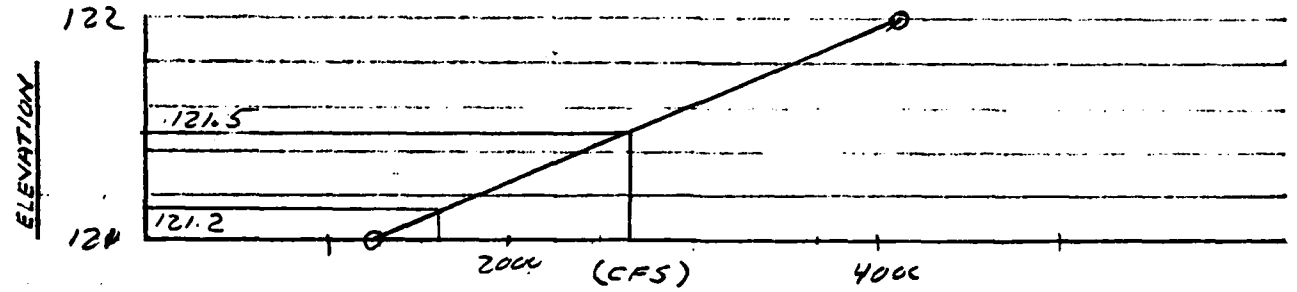
1630+1060=

Q_{P_1} = 2690 CFS

FULL SPILLWAY Q_S = 1060 CFS

TOTAL STORAGE (S) = 200 AC-FT

ELEV	AREA	WP	R	Q	DEPTH
121	2600	2600	1	1280	1
122	5200	2600	2	4060	2



$V_1 = \left(\frac{2.3 + 1.5}{2}\right)\left(\frac{1100}{1} + \frac{2600}{1}\right)\left(\frac{1000}{43560}\right)\left(\frac{1}{2}\right)$ = 81 AC-FT

$Q_{P_2} = Q_{P_1}(1 - V_1/S)$ = 1600 CFS V_{AVG} = 78

$V_2 = \left(\frac{2.3 + 1.2}{2}\right)(42.5)$ = 74 AC-FT

$Q_{P_2} = Q_{P_1}(1 - V_{AVG}/S)$ = 1650 CFS ELEV = 121.2

1650-1060 = 590 DEPTH = 1.2

FULL SPILLWAY & DEPTH = .9

INCREASE DUE TO DAM FAILURE = 0.3

A. Size Classification

Height of dam = 12.0 ft.; hence small

Storage capacity at top of dam (elev. 129.3) = 200 AC-FT.; hence small

Adopted size classification: small

B.i) Hazard Potential

While depth of flooding is relatively shallow, it affects a large area encompassing eleven homes. The potential exists for the loss of more than a few lives.

Adopted hazard classification: High

ii) Impact of Failure of Dam with pool at top of dam.

It is estimated from the "rule of thumb" failure hydrograph, that the following adverse impacts are a possibility by the failure of this dam.

a) Loss of homes 11;
b) Loss of buildings 0;
c) Loss of highways or roads 0;
d) Loss of bridges 0;

The failure profile can affect a distance of 5500 feet from the dam.

C. Hazard Potential Classifications

HAZARD	SIZE	TEST FLOOD RANGE
High	Small	1/2 PMF to PMF

Adopted Test Flood = 1/2 PMF = 844 CSM

= 4220 CFS

D. Overtopping Potential

Drainage Area -- = 5.0 sq. miles

Spillway crest elevation = 127.0

Top of Dam Elevation = 129.2

Maximum spillway discharge

Capacity without overtopping of dam =	1060	CFS
"test flood" inflow discharge =	4220	CFS
"test flood" outflow discharge =	4160	CFS

RATING CURVE DEVELOPMENT

WRIGHTS POND DAM

Spillway

$$Q = C\ L\ H^{3/2}$$

$C = 3.05$

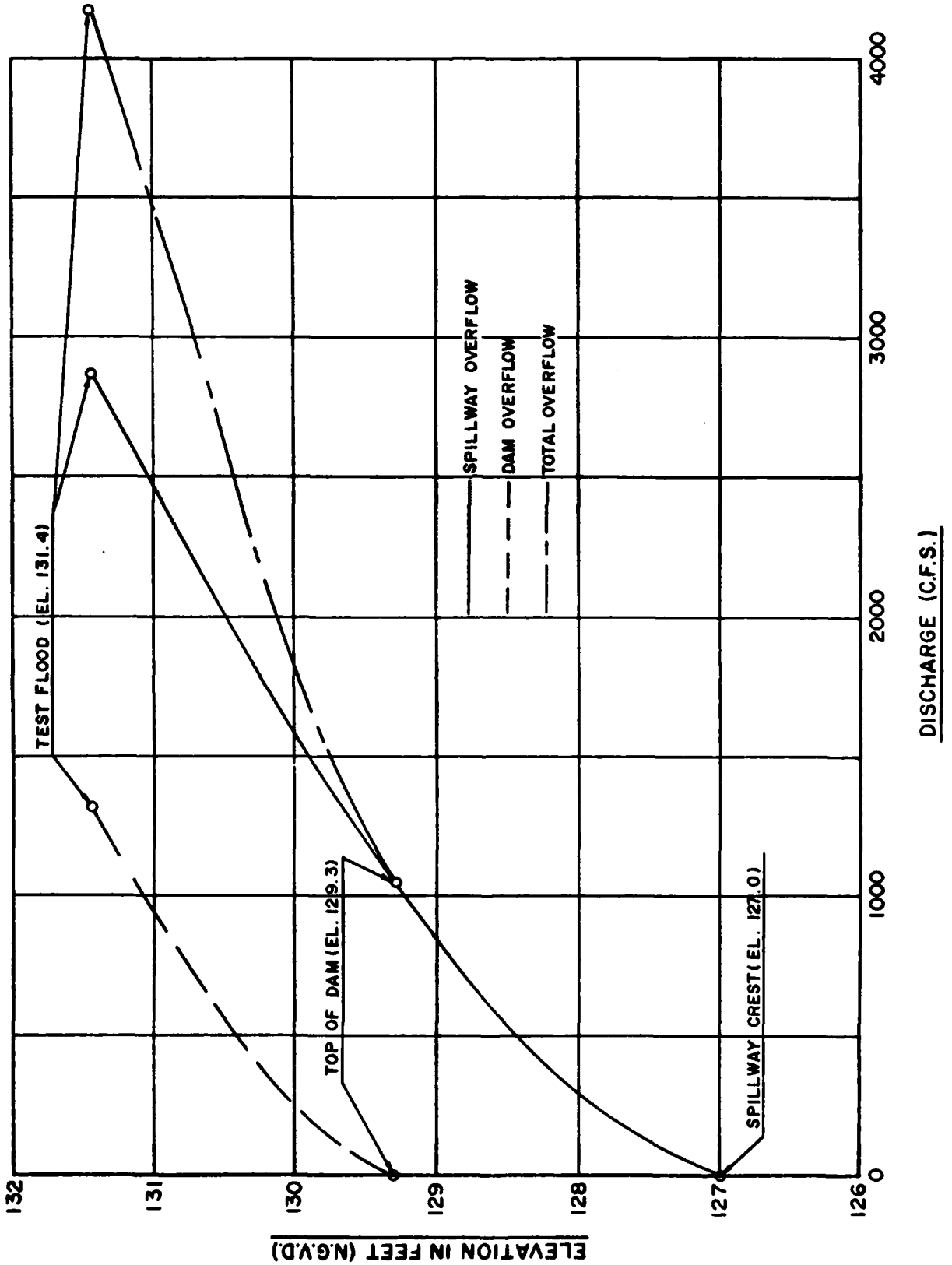
$L = 100.0$ feet

18 Inch Outlet

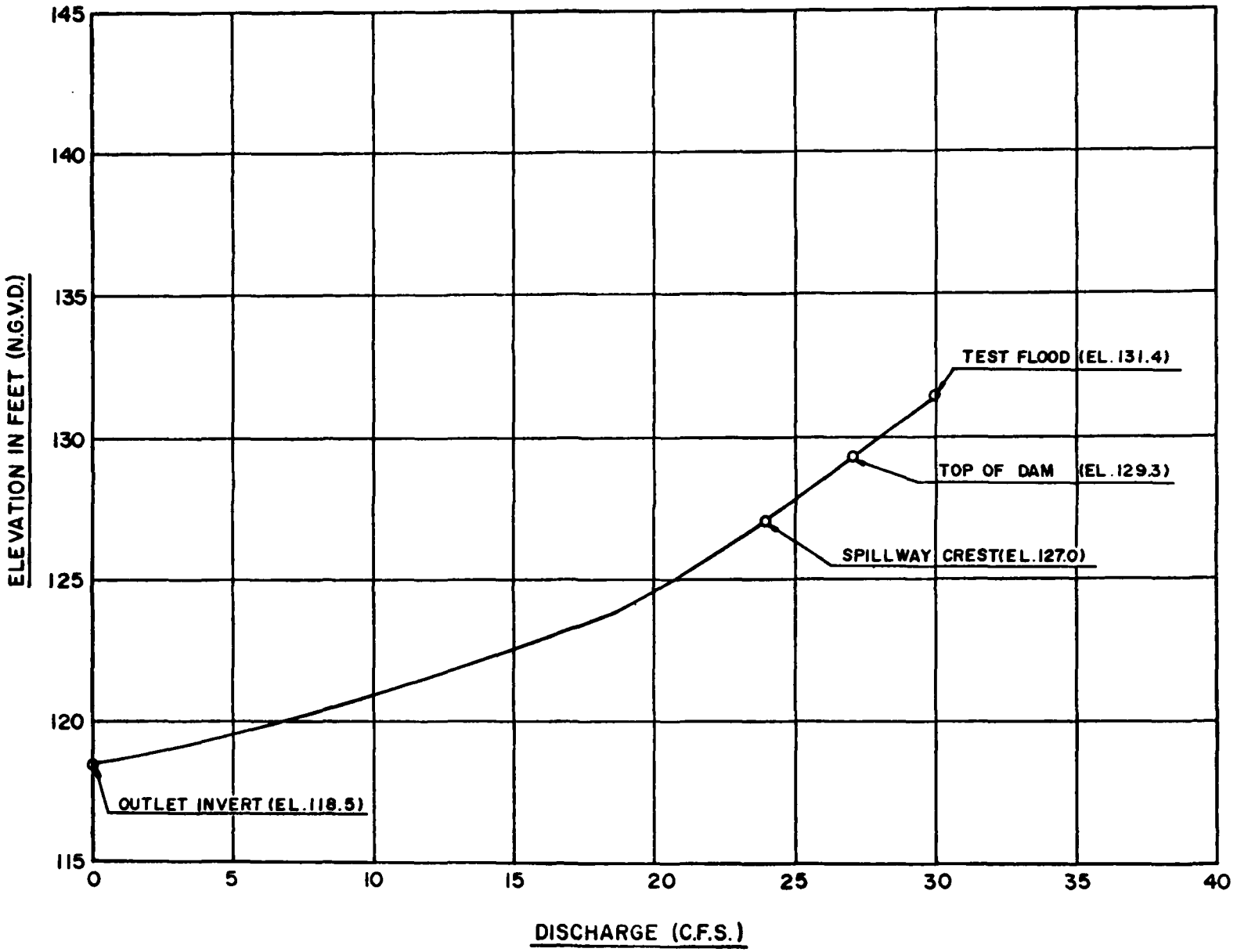
$$Q = c\ a\ (2\ g\ h)^{1/2}$$

$c = 0.6$

$a = 1.77$ square feet

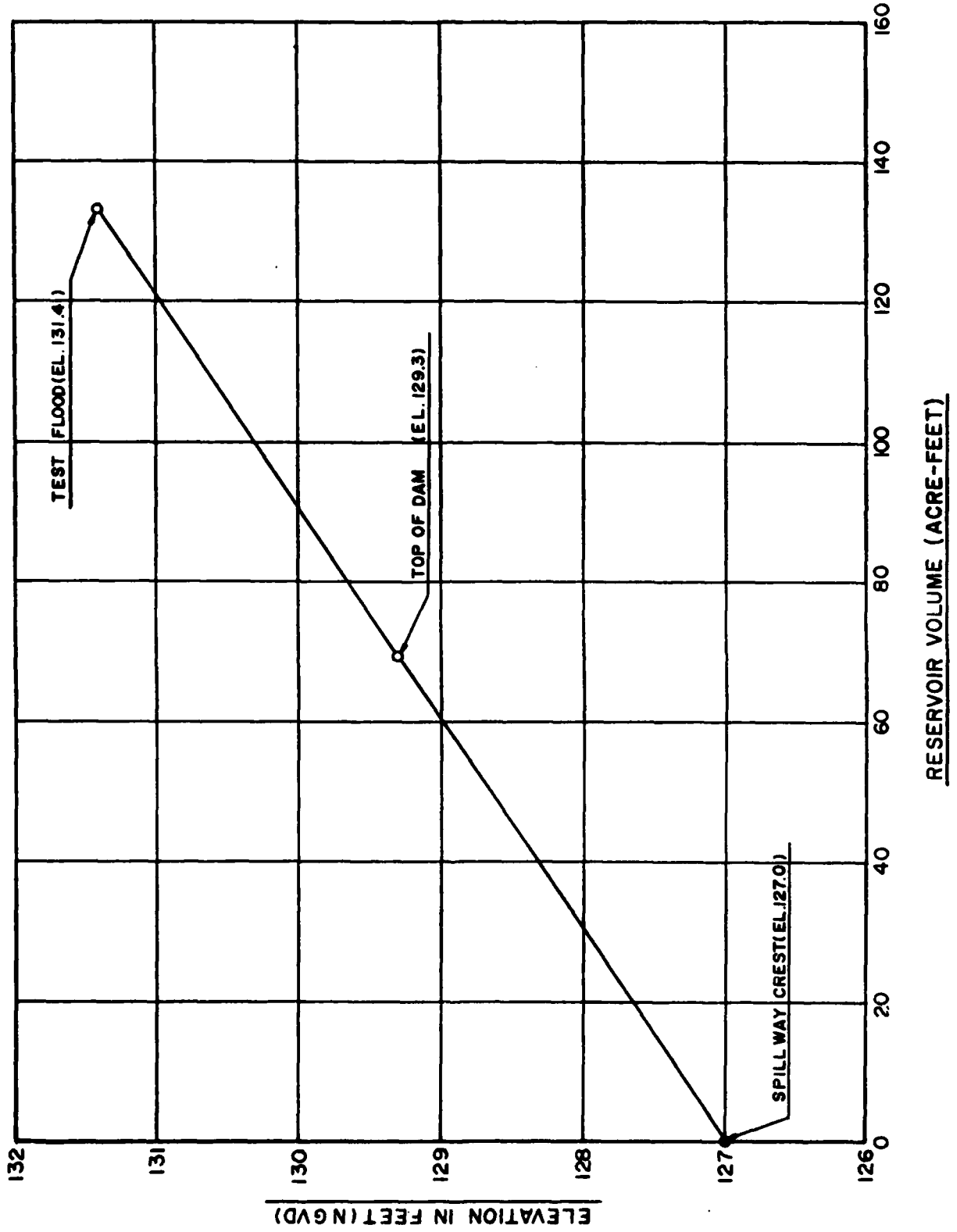


WRIGHTS POND DAM
SPILLWAY RATING CURVE



D-28

WRIGHTS POND DAM
18 INCH OUTLET
OUTLET WORKS RATING CURVE



WRIGHTS POND DAM

D-29 RESERVOIR STAGE-CAPACITY CURVE

APPENDIX E

INFORMATION AS CONTAINED IN THE

NATIONAL INVENTORY OF DAMS

NOT AVAILABLE AT THIS TIME

END

FILMED

10-84

DTIC